Site: Big River Mine T
ID #: MOD981126899
Break: 1.8
Other:
10/30/1991 07CR

ecology and environment, inc.

CLOVERLEAF BUILDING 3, 6405 METCALF, OVERLAND PARK, KANSAS 66202, TEL. 913/432-9961

International Specialists in the Environment

40107624

SUPERFUND RECORDS

MEMORANDUM

RECEIVED
OCT 31 1991
SAFE SECTION

TO: Pete Culver, RPO

THRU: Sharon Martin, FITOM

FROM: Bob Overfelt, AFITOM

DATE: October 30, 1991

SUBJECT: Recommendations and HRS Considerations for the big River Mine Tailings site, Desloge, Missouri.
TDD #F-07-9004-011 PAN #FM00616XA
Site #Y60 Project #003
Superfund Contact: Greg Reesor
FIT Project Leader: Robert Overfelt

The Big River Mine Tailings site covers approximately 600 acres. It consists mainly of lead mine tailings, ranging from 0 to more than 100 feet deep. An active sanitary landfill and landfill office are located on 60 acres of the southwest portion of the site. The majority of the site is situated within a horseshoe meander of the Big River. Therefore, the site is bordered by Big River on its west, north, and east sides. Residential areas and the town of Desloge are adjacent to the site to the south and southeast, respectively. The site is the result of 30 years (1929 to 1958) of stockpiling lead mining wastes from a stope and pillar mine and mill operation located near the southeast edge of the site.

The site was first brought to the attention of the EPA in 1977, after an estimated 50,000 cubic yards of the tailings slumped into Big River during a heavy rainfall. The tailings contained elevated levels of lead, cadmium, and zinc, as well as other metals of concern. Because the tailings consist of powder, silt, and sand-sized particles, they are easily eroded via wind and water. Due to the proximity of the site to Big River and to the town of Desloge, as well as the existence of the on-site landfill, there were major concerns about the influence of the surface water and sediment quality of Big River, the shallow ground water quality, and the ambient air quality on and off site.

A Listing Site Inspection (LSI) was conducted by E & E/FIT, July 21 through 29, 1990. The objectives of the LSI were to determine the level of toxic metals of concern present in the tailings on site and characterize how the site is influencing the ambient air, surface water, and ground water quality on site, as well as in the surrounding area. Therefore, tailings, soil, surface water, sediment, ground water, and air samples were collected to establish the heavy metal concentrations of the tailings and determine if the metals are migrating off site. The sample results confirmed that the tailings contain significantly elevated levels of lead, cadmium, and zinc, as well as other metals of concern. Surface water and sediment sample results indicate that heavy metal laden tailings material is influencing the ambient air on site and is migrating at least 1,500 feet off site.

A fully documented HRS package has been prepared for the site. The surface water pathway score with an observed release is 100. The air migration pathway score with an observed release is also 100. The score for the soil exposure pathway is 94. The HRS site score calculated using these three pathways is 84.9. The ground water pathway was not evaluated because of its complexity relative to the other pathways and also because each of the other three pathways generates a score high enough to produce an overall site score above 28.5.

Surface Water Pathway

An observed release to surface water was scored based on visual direct releases and on surface water and sediment sample data. Besides the castrophic tailings release of 1977 to Big River, more minor events have occurred and will continue. Tailings are in continuous contact with Big River at numerous locations along the perimeter of the site. Although a warning was issued by the Missouri Department of Natural Resources to not eat bottom feeding fish from Big River, many local residents continue to fish and swim in Big River at the site and downstream.

Air Pathway

The tailings physical nature can be described as dust, silt, and sand-sized particles. Therefore, the tailings are easily airborne and once they enter the ambient air, are easily transported off site. The air pathway was also scored based on a visual direct release, as well as on hi-volume air sample data. The principle receptors of the heavy metal laden particulates are the people who breath the material. Seven people work full-time on site. Residential areas that include a school and a day care center are adjacent to the south and southeast borders of the site. Approximately 20,000 people reside within a 4-mile radius of the site.

Soil Exposure Pathway

Although the ground water pathway was not scored, data indicates that the shallow ground water on site contains elevated level of toxic metals. Metals were detected at extremely high concentrations in shallow ground water near the landfill operation. This may be the result of landfill leachate mobilizing the metals. Also, the drinking water well at the landfill office contained dissolved lead at concentrations (14J μg/L) higher than the proposed MCL. Many other private drinking water wells exist in the area. The nearest municipal well is located 3,000 feet southeast of the site. Approximately 20,000 people in a 4-mile radius of the site utilize ground water for drinking.

Lead, cadmium, zinc, and other toxic metals of concern are present at elevated levels in the tailings at the Big River Mine Tailings site. These contaminants are actively being transported via wind and water erosion into the ambient air and Big River. It is recommended that a comprehensive stabilization plan be drafted in order to control surface water and air releases at the site.

The ground water on site also contains elevated levels of metals. Samples collected around the landfall indicate that leachate may be mobilizing and releasing metals in even greater concentrations. It is therefore recommended that further study of the on-site ground water be performed to determine the effects of the on-site landfill.

It should be emphasized that while the LSI has identified the Big River Mine Tailings site as a major source of toxic metal contamination in the area, the problem is regional and multi-source. Many other lead tailings piles contribute to the toxic metal contamination of the Old Lead Belt area. Therefore, it is recommended that a comprehensive study of the entire region be conducted in order to characterize each potential source, the regional air quality, and the effects of the region on the Big River drainage basin. This investigation should also include lead-blood level sampling of local residents and lead dust sampling in local residences.

Final Report
Listing Site Inspection
Big River Mine Tailings
Desloge, St. Francois County, Missouri
TDD #F-07-9004-011 PAN # FM00616XA
Site #Y60 Project #003
Submitted to: Region VII EPA by E & E/FIT
Superfund Contact: Greg Reesor
FIT Task Leader: Bob Overfelt, AFITOM
Date: October 30, 1991

Table of Contents

LIST OF APPENDICES

LIST OF FIGURES

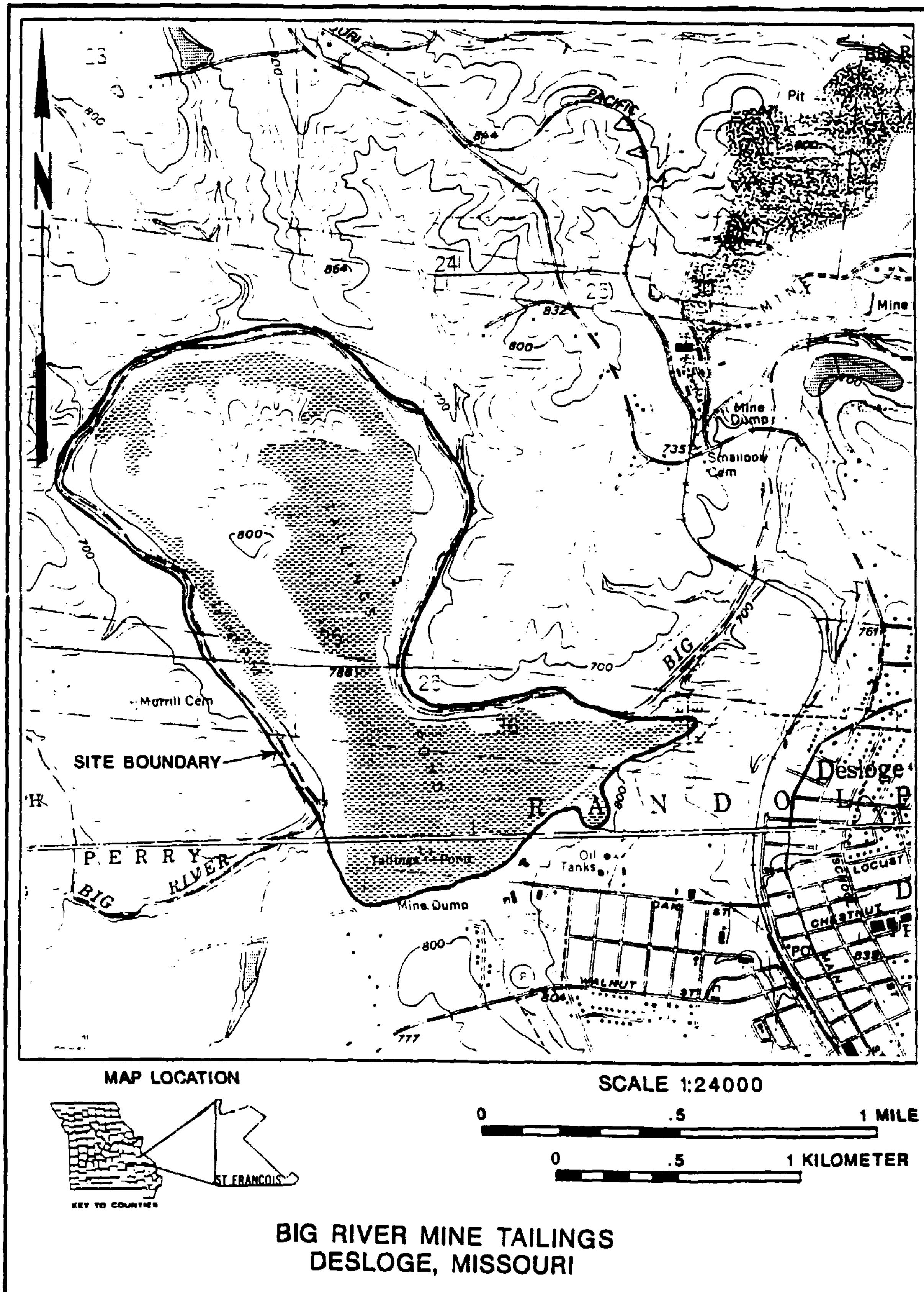
LIST OF TABLES

SECTION I: INTRODUCTION

The Ecology and Environment, Inc., Field Investigation Team (E & E/FIT) was tasked by the U.S. Environmental Protection Agency (EPA) under Technical Directive Document (TDD) #F-07-9004-011 (Appendix B) to conduct a Listing Site Inspection (LSI) of the Big River Mine Tailings site near Desloge, Missouri.

The Big River Mine Tailings site is located in St. Francois County adjacent to the north and west boundaries of the town of Desloge, Missouri (Figure 1-1). This area of southeast Missouri is a region known as the "Old Lead Belt" and was formerly a major producer of lead. The coordinates of the approximate center of the site are 37° 53′ 11.4" N latitude and 90° 33′ 00.0" W longitude (USGS 1982).

The objectives of the LSI were to determine the level of toxic metals of concern present in the tailings on site and characterize how the site is influencing the ambient air, surface water, and ground water quality on site as well as in the surrounding area. The LSI field work was conducted July 21 through 29, 1990 by E & E/FIT members: Bob Overfelt, team leader and sampler; Chris Williams, Site Safety Officer and sampler; Sharon Martin, sampler; Curt Enos, sampler and HRS information; Annette Sackmann, air sampling trainer; Otavio Silva, air and soil sampler; Patty Roberts, air and soil sampler; and Wes McCall, air and soil sampler.



WASTE SITE TRACKING #: MO0616
PREPARED BY: R. OVERFELT

ECOLOGY & ENVIRONMENT FIT MARCH 1988
SOURCE: USGS 7.5' BONNE TERRE
& FLAT RIVER, MO QUADS. 1982

FIGURE 1-1: SITE LOCATION

SECTION 2: SITE DESCRIPTION AND HISTORY

2.1 SITE DESCRIPTION

The Big River Mine Tailings site covers approximately 600 acres (Appendix A; Plates 1 and 3). It consists mainly of mine tailings ranging from 0 to more than 100 feet deep (EAP 1981). An active sanitary landfill and landfill office are located on the south end of the site. The landfill is operated by the St. Francois County Environmental Corporation (SFCEC) which has a state permit to fill approximately 60 acres (Hudwalker 1988). There are six monitoring wells installed around the landfill. The well logs for these wells are included as Appendix G. These wells are drilled to the base of the tailings. The average thickness of the tailings calculated from the well logs is approximately 50 feet. The majority of the site is situated within a horseshoe meander of the Big River (Plate 3). Therefore, the site is bordered by Big River on its west, north, and east sides. Residential areas and the town of Desloge are adjacent to the site to the south and southeast.

In order to simplify referencing specific areas on site, the three main areas discussed will be referred to as the meander area, the landfill area, and the St. Joe Minerals property. The landfill area and St. Joe Minerals property make up the southwest and southeast sections of the site, respectively, while the meander area consists of all property north of these areas within the Big River meander (Plate 3).

The site is the result of 30 years (1929 to 1958) of stockpiling lead mining wastes from a mine/mill operation located on the southern edge of the site (Novak 1980). After processing the lead ore, the tailings were transported to a designated disposal location on the site via a slurry pipeline. At the time of deposition, the material was about 50 percent water, and ponded areas would form on site, hence the name "tailings pond". Because the tailings are porous and highly permeable in most instances, the ponds dried up rapidly. There is only one small ponded area located on the west side of the site that always contains water (Plate 1). Other areas temporarily pond after heavy rainfall events but rapidly dry up. The vast majority of the site consists of dry, unvegetated tailings; therefore, it will be referred to as a tailings pile.

The site was brought to the attention of the EPA in 1977, after an estimated 50,000 cubic yards of the tailings slumped into Big River during a heavy rainfall. The tailings contain elevated levels of lead, cadmium, and zinc as well as other metals of concern. Because the tailings consist of powder, silt, and sand-sized particles, they are easily eroded via water and wind. Due to the proximity of the site to the Big River and to the town of Desloge, there were major concerns about the site's influence on the surface water and sediment quality of Big River as well as ambient air quality on and off site.

Photo 1 illustrates the area of the 1977 major tailings collapse into the Big River (Appendix F). This was taken during the 1988 Preliminary Assessment (PA) reconnaissance. Photo 2 illustrates tailings erosion on top of the pile at the major area of collapse. Photo 3, taken during the 1988 PA reconnaissance, illustrates the proximity of site to Big River on the east side as well as the migration of wind blown tailings. A strong west/northwest wind was transporting the tailings in a east/southeast direction toward the town of Desloge during the January 1988 PA reconnaissance. The predominate winds that transport the tailings appear to be from the southwest, west, and northwest. This can be concluded by the dune-like migration of the tailings that is apparent on site. The primary migration appears to be from west to east, although the prevailing wind in the area is from the south (SCS 1981). Some south to north migration is evident, however, most migration appears to be west to east. This is particularly evident in the relatively flat, unvegetated, and most elevated portion of the meander area. This area lies directly west of the major collapse area and extends approximately 2,000 feet north, 1,500 feet south, and 2,000 feet west. The topographic map in Appendix H illustrates this area. Photo 4 illustrates the barchan-type dunes and ripples that have formed in this elevated portion of the meander area. The wind fence in the photo was emplaced by SFCEC to aid in prevention of the erosion. The fencing has had minimal effect, and much of it is in need of repair. Other areas on site that release tailing particulates readily to the ambient air are the landfill operations area and the huge tailings pile located on St. Joe Minerals property that is elevated 75 to 100 feet above the adjacent tailings (Photo 5). Photo 6 was taken from the top of the large St. Joe Minerals property pile and illustrates the meander area bordering Big River to the west and farmland to the east. Howard Wood, owner of the farm property to the east of the site, stated that he never had to apply agricultural lime to his property, because so much of the tailings material blows from the site and is deposited on his fields.

Tailings have been transported by surface water erosion to Big River in many areas along the perimeter of the site bordering Big River. Section 3 documents the history of these major areas. Some have been stabilized, and some are actively transporting tailings or in direct contact with the river. During the LSI reconnaissance of the river and site border, the areas where tailings are obviously being transported into the river by surface water erosion or areas where tailings are in contact with the river were documented. These areas are illustrated on Plate 3. Photos 7 and 8 illustrate two of these areas on the west side of the site. During the reconnaissance, it became obvious that a large portion along the northern border of the site had tailings in contact with the river; therefore, this area was marked on Plate 3. Photo 9 illustrates one of these numerous areas along the north perimeter. Photo 10 shows tailings in contact with the river at the east bend on the east side of the site. The bank is very steep and undercut by the river which releases additional tailings. Tailings at this location constantly exceed their angle of repose and fall into the river.

The on-site landfill is also considered a serious problem for two reasons. First, the activity around the landfill operations continuously creates dusty conditions and releases additional heavy metal-laden particulates to the ambient air. Workers on site are constantly exposed to tailings dust. The second reason for concern is the leachate production from the landfill. Landfill leachate is typically low pH and contains large quantities of organic material. This condition could possibly dissolve and mobilize heavy metals bound in the tailings. Therefore, these metals could easily migrate to the shallow ground water and to Big River. Results from a leachate sample taken during the LSI confirms that this problem does exist.

During the LSI, several previously unknown site features were documented. The most significant of these features include a drainage tunnel, artesian wells, and a swimming area.

A drainage tunnel approximately 10 feet wide, 15 feet high, and 1,500 feet long runs under the southwest corner of the site. The tunnel entrance (Photo 11) is located approximately 300 feet southeast of the landfill office (Plate 3). The tunnel trends southeast/northwest and exits at an opening (Photo 12) approximately 200 feet southeast of the west Desloge river access (Plate 3). Water flowing through the tunnel then drains directly into the Big River. In an interview with landfill manager Bryant AuBuchon, E & E/FIT learned that the tunnel was built by St. Joe Minerals. It was used to divert surface water drainage from a tributary to Big River that once traversed and drained the south part of the site. This former tributary has obviously been filled with tailings. E & E/FIT did not perform a reconnaissance through the drainage tunnel due to safety restrictions; however, AuBuchon confirmed the actual path from his experience.

The area near the drainage tunnel entrance is approximately 50 feet lower in elevation than the adjacent access road and landfill area to the north, due to the thickness of the tailings (Photo 13). Because the landfill operators had a problem with ponding water in an area approximately 200 feet north of the tunnel (Photo 14), a culvert was installed under the access road that drains from this ponded area to the drainage tunnel entrance (Photo 13). Also, a constant flow of landfill leachate seeps into the drainage tunnel in the area (Photo 15). One other notable feature near the drainage tunnel entrance is another drainage tunnel that once drained an area on the tailings pile from a drainage tower (Photo 16). This opening is approximately 20 feet north of the drainage tunnel and appears to trend in a north/south direction underneath the tailings. This tower drainage tunnel drains into the drainage tunnel leading to Big River. It appears that the tower drainage tunnel contributes a significant amount to tailings runoff.

AuBuchon stated that during heavy rainfall events, a significant amount of tailings is carried through the drainage tunnel and deposited into Big River. E & E/FIT observed that the bottom of the tunnel near the entrance was lined with tailings at least one to two feet thick (Photo 11). It is obvious that the landfill leachate also flows through the tunnel and into Big River. Therefore, E & E/FIT sampled the leachate and tailings at the tunnel entrance and the water at the tunnel exit in order to characterize the contaminants in the water and sediment entering Big River via the tunnel.

While performing a reconnaissance near Owl Creek just west of the site, the E & E/FIT discovered four artesian wells. In an interview with Bryant AuBuchon, it was determined that these were actually former exploratory borings installed many years ago by St. Joe Minerals in order to determine the areal and vertical extent of the lead ore deposits. Apparently, the borings were never plugged after installation. These borings are cased with two-inch diameter steel casing that rises one to two feet above the ground surface. Ground water conditions in the site vicinity apparently have created artesian conditions in these borings (Photo 17). All of these artesian wells were located near the east bank of Owl Creek, north of the abandoned railroad spur, and south of the Owl Creek and Big River confluence. Two of the artesian wells are located at sample location 324 (Plates 2 and 3), and two of the wells are located at sample location 301 (Plates 2 and 3). All of these wells were producing several gallons of water per minute. This water flows directly into Owl Creek which drains into Big River. The E & E/FIT sampled one well at each location.

The E & E/FIT also determined during the LSI that a large tailings sandbar on Big River located on the northwest side of the site is used as a swimming and fishing area for the landfill workers and their friends (Plate 3). A road to access this swimming area had recently been constructed before the LSI fieldwork. AuBuchon confirmed that the area is used for swimming and fishing. The E & E/FIT sampled the surface water and sediment at this location.

It is important to realize that all of the major tailings piles in this former mining region are contributing to the contamination entering Big River and its tributaries, and that all are potentially impacting the ambient air. Consequently, the problem is regional and cannot be attributed to only one waste pile. However, the Big River Mine Tailings site (Big River pile) is unique in several ways that make it more detrimental to the environment. Because it borders Big River on three sides and is elevated above the river, tailings directly enter Big River via wind and water erosion as well as by undercutting of the tailings by the river. None of the other piles in the area are situated on Big River. As of 1980, an estimated 90,000 cubic yards of tailings have been eroded into the Big River from the site (Novak and Hasselwander 1980). E & E/FIT has observed active deposition of tailings into the river and areas on site where tailings are continuously in contact with Big River. Another notable difference about the site is that it was deposited on relatively flat topography. Therefore, as the pile of tailings accumulated, it became topographically elevated above the surrounding area. With no vegetation to stabilize the elevated areas, tailings are more easily transported to the ambient air. This occurs over much of the site; however, the large, flat, elevated area in the east-central portion of the meander area is the most severely eroded. The topographic map of the site included in Appendix H illustrates this elevated area. Tailings constantly migrate from west to east in this area creating dune features typical of aeolian deposits. Photos 3 and 4 illustrate erosion in this portion of the meander area. Other large tailings piles, such as the Leadwood and Federal piles (See Section 2.2), were deposited in valleys of dammed tributaries. As they were deposited, they filled in these valleys. While some elevated areas exist on these piles and on other tailings piles in the area, due to the size of the Big River site and relative elevation, it appears to have greater potential to create significant tailings particulate releases to the ambient air. Air monitoring of individual tailings piles is needed to confirm or refute these observations.

The on-site landfill is another unique site characteristic. No landfills are known to exist in other tailings piles. Complications associated with the landfill were discussed previously in this section. Consequently, while the metals contamination in the area cannot be attriubted to one mining waste source, the Big River site appears to contribute a disproportionate share of the contamination due to its specific characteristics.

2.2 SITE HISTORY

The Big River Mine Tailings site is located in an area known as the Old Lead Belt. The Old Lead Belt is located entirely in St. Francois

County and covers an area of approximately 110 square miles (USGS 1988).

Lead was first discovered in southwestern Missouri in the early 1700s. Until the 1860s, mining in the area was restricted to shallow workings from pits or trenches. In 1864, the St. Joseph Lead Company purchased 964 acres and began mining in Bonne Terre, Missouri. Plates 1 and 2 illustrate the towns and mining waste piles of the Old Lead Belt. Diamond-bit core drilling of the area began in 1869 and determined lead rich ore deposits existed under the towns of Bonne Terre, Desloge, Flat River, Leadwood, and Elvins. As many as fifteen lead companies operated in the area from the late 1800s to early 1900s. However, by 1933, all of the properties in the area had been acquired by the St. Joseph Lead Company. The St. Joseph Lead Company is presently known as the St. Joe Minerals Corporation. The St. Joseph Lead Company operated mine/milling operations at Bonne Terre from 1864 to 1961, at Desloge (Big River Mine Tailings site) from 1929 to 1958, and at Leadwood from 1915 to 1962. Mining activity in the area began to decrease in the 1950s and 1960s as the ore deposits were depleted and with the discovery of the Viburnum Trend (New Lead Belt) which had higher grade ore. The Federal Division of the St. Joseph Lead Company was the last mine to close in the Old Lead Belt in 1972 (USGS 1988).

This area was the nation's largest producer of lead from 1907 to 1953. Approximately eight million tons of lead were produced. Mining wastes or tailings were produced and disposed of in piles directly on the land surface. Early mining methods produced coarse tailings (known locally as chat) from mechanical separators that concentrated the ore. As technology improved chemical separators were used that produced fine-grained tailings. The majority of the Big River site consists of fine-grained tailings. However, both methods produced wastes that contain elevated metals levels. An estimated 250 million tons of tailings were produced in the Old Lead Belt. The Big River drainage basin which drains the Old Lead Belt is estimated to contain 3,000 acres of tailings. Tailings from these waste piles are easily transported and released to surface water bodies and ambient air via wind and water erosion. Plates 1 and 2 illustrate the major tailings piles that make-up the Old Lead Belt wastes as well as the tributaries of Big River that drain them.

The St. Joe Minerals Corporation (formerly St. Joseph Lead Co.) owned and operated the mining and milling operation that produced the tailings at the Big River site. In 1972, the corporation donated the majority of the site, 502 acres, to St. Francois County (Novak 1980). Approximately 100 acres, which is located directly east of the present landfill, is still owned by St. Joe Minerals (Hudwalker 1988; Plate 3).

After acquisition of the 502 acres, St. Francois County leased the land to the St. Francois County Environmental Corporation (SFCEC) (AuBuchon 1987). In 1973, the non-profit SFCEC established a sanitary landfill on approximately 60 acres of the southwest section of the mine tailings pile (EAP 1981; Hudwalker 1988). AuBuchon (1987) stated that the landfill accepts typical residential refuse and debris, and that the refuse is not separated into specified cells. The landfill operation has four full-time employees: AuBuchon and three heavy equipment operators. Hudwalker and Associates, Inc., a consulting engineering firm located in Farmington, Missouri, has administered landfill operations and maintenance of the tailings pile since 1985 (Hudwalker 1988).

Part of the 100-acre area on the east side of the site owned by St. Joe Minerals Corp. is currently leased to the Morgan and White Company (Plate 3). Morgan and White use tailings and chat from this portion of the site for mixing asphalt and sell the tailings for agricultural lime. The number of workers at Morgan and White varies. There are three full time workers; however, during the peak asphalt season (April through September), there are up to five workers on site.

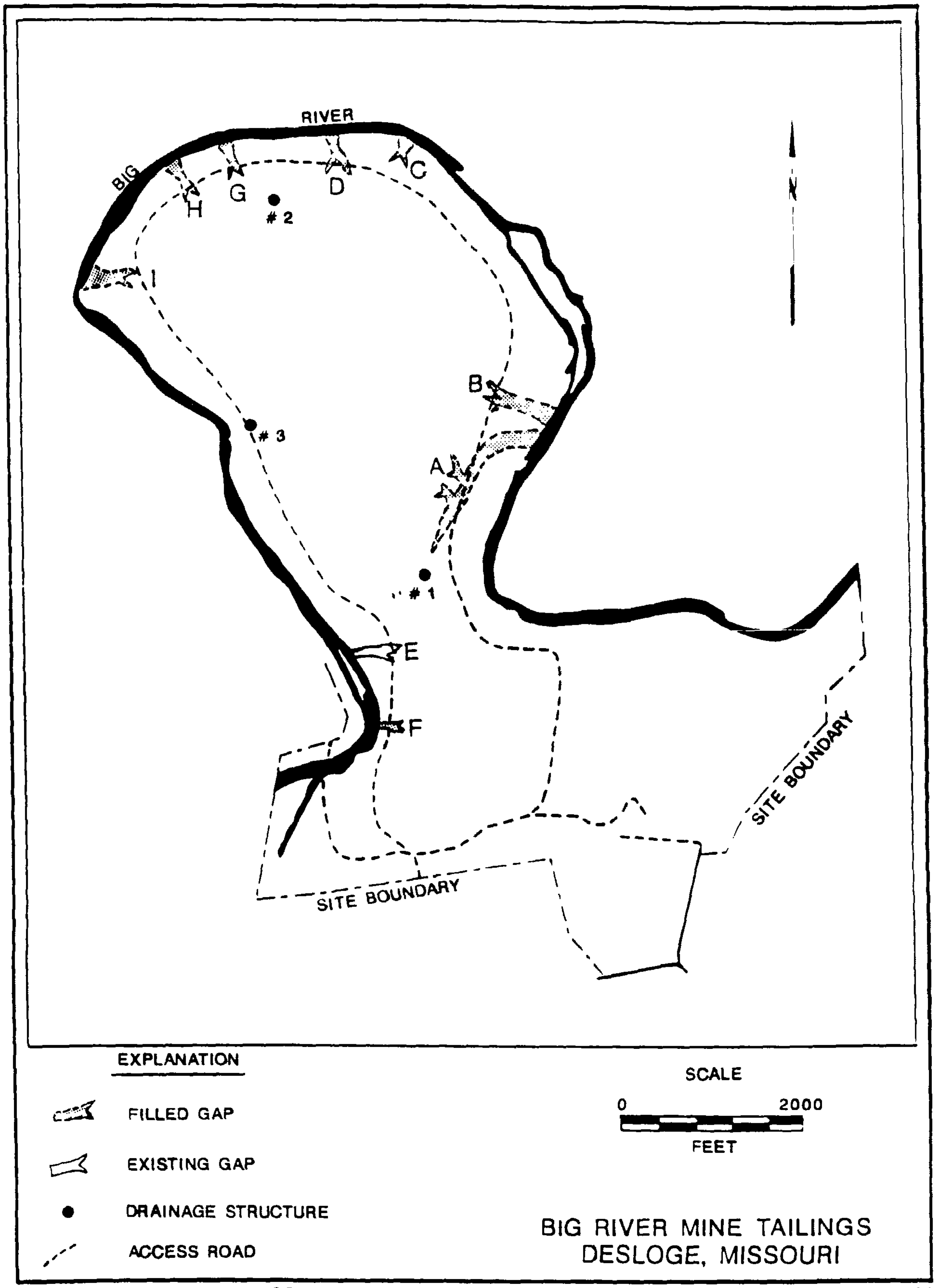
Marvin Hudwalker of Hudwalker and Associates, Inc., was present during the January 1988 PA reconnaissance. He stated that mine tailings were used as daily cover on the landfill trash, and that when a cell is filled, a one-yard thick clay cover is applied, and grass is planted. During the PA reconnaissance, the filled landfill cells were noted to have a continuous cover and the area was relatively clean.

A review of the Missouri Department of Natural Resources (MDNR) files regarding the landfill revealed that the landfill operation was very inadequate before Hudwalker and Associates took over administration. The facility was cited numerous times for various violations. Photographs from repeated inspections of the landfill depict large amounts of refuse with no cover or vegetated cap (Burris 1988).

According to a 1977 University of Missouri-Columbia (UMC) report, the area experienced a severe storm event involving the section of the tailings pile known as Gap A, adjacent to the Big River on the southeast side of the meander area (Figure 2-1). This portion of the mine tailings pile became supersaturated and collapsed, releasing its contents into the Big River (Appendix F; Photo 1). Although the exact quantity of mine tailings that washed into the river is not known, estimates suggest that the quantity may have been as much as 50,000 cubic yards (Hudwalker 1988; Figure 2-1). When MDNR discovered this catastrophic event, they requested that the EPA Surveillance and Analysis team (SVAN) conduct an extensive investigation of the Big River. The SVAN conducted a survey in late 1977, and the general findings, based on aquatic population density and diversity, were that the Big River was degraded by the mine tailings that entered the river. The degradation was mainly the result of physical changes in the benthic zone of the river rather than chemical toxicity of the river water (EAP 1981).

In 1980, the Missouri Department of Conservation (MDC) submitted evidence that some fish sampled downstream from the tailings pile contained elevated lead levels (EAP 1981). This report concluded that the high concentrations of lead were found in the edible tissue of fish found in the Big River downstream from the location where mine tailings had entered the river during the 1977 rupture. The highest concentration, 1.30 parts per million (ppm), was found in sample nine from four golden red-horse fish collected immediately downstream from the collapsed Desloge tailings pile. The World Health Organization (WHO) dietary limit for lead is 0.3 ppm (Czarneski 1984).

As a result of these findings, the state of Missouri issued a press release cautioning local residents not to eat bottom-feeders taken from a 50-mile stretch of the Big River from the city of Leadwood (near the Desloge tailings pile) downstream to Washington State Park (Gale et al. 1982). Since 1980, numerous research projects have focused on the impact of the mine tailings piles in the Old Lead Belt on the Big River. Results of various studies are presented in Section 3.



WASTE SITE TRACKING #: MOO616
PREPARED BY: R. OVERFELT

ECOLOGY & ENVIRONMENT APRIL 1988

Source: Novak 1980

Figure 2-1: Major Erosional Features

By December 1981, St. Joe Minerals Corporation, under a cooperative agreement with the state of Missouri, began limited remedial action on the pile in an effort to fill the erosional gaps and stabilize the pile (Mattson 1987). Many smaller erosional events have been documented since the massive 1977 release. Section 2.3 details the past and present erosional problems as well as the efforts undertaken to stabilize the pile.

In the spring of 1985, the Desloge Tailings Task Force was organized to deal with the existing problems of the Desloge Mine Tailings site. The Task Force, organized by St. Joe Minerals, consisted of representatives from St. Joe Minerals, the landfill, and MDNR, as well as local officials and others. Specific Task Force activities are detailed in Section 2.3. The Task Force focused on three primary objectives:

1. Provide adequate site supervision to ensure proper repair and maintenance.
2. Develop and implement short-term measures to stabilize the site.
3. Develop a long-term stabilization plan for the site.

Landfill authorities requested a permit from the state of Missouri to expand operation into 200 additional acres of the tailings pile. In January 1987, as a result of this proposed expansion, the MDNR requested that six monitoring wells be installed around the existing landfill to determine whether the ground water contained significant quantities of landfill leachate (Plate 3). The well logs for these six monitoring wells are included as Appendix G. Water samples were taken from the wells during the LSI. Table 2-1 summarizes the pertinent site history events as well as stabilization efforts.

2.3 STABILIZATION EFFORTS

After the massive release of mine tailings into the Big River in 1977, efforts to stabilize this mine tailings pile were initiated. A number of remedial efforts have been accomplished. Reports from several agencies detail the problems that exist at the site and present solutions to these problems.

Table 2-1
Site History and Stabilization Efforts

Date	Chronology of Pertinent Site Events
1929-1958	Mining occurred and tailings were deposited in slurry form.
1973	St. Joe Minerals Corporation donated 502 acres to St. Francois County. St. Francois County leased the land to the St. Francois County Environmental Corporation which opened the existing landfill.
1977	Collapse of tailings in Gaps A and B; SVAN reports degradation of Big River due to influx of tailings during collapse.
1980	Missouri Department of Conservation determined elevated Pb levels in bottom-feeding fish and issued a press release cautioning local residents not to eat these fish.
1981	St. Joe Minerals began remedial activity in an attempt to stabilize the tailings.
1983	Gaps G and H were formed by overtopping of the retaining berm.
1984	1,500 feet of wind fencing installed.
1985	Desloge Tailings Task Force was orgainzed. Gap I was formed by overtopping. Burns and McDonnel long-term stabilization plan. Twenty acres near Gap I were seeded. This area appears to be growing well today. Installation of an additional 2,000 feet of wind fencing.
1986	10,000 Black Locust trees planted; mostly near Gap I.
1987	Monitoring wells installed around landfill. Some 15,000 Black Locust trees planted near Gap G. Some 20,000 feet of wind fencing installed.
1988 (Jan)	E & E/FIT Preliminary Assessment reconnaissance.
(May)	E & E/FIT Limited Site Inspection.
1990	E & E/FIT Listing Site Inspection.

A comprehensive report prepared in 1980 for MDNR by the UMC College of Engineering characterizes the major environmental concerns at the site including water and wind erosion and the apparent hazard of constructing a landfill in the tailings pile. The UMC investigation concluded that the tailings pile contained numerous points where tailings are entering the Big River due to water erosion. The UMC team designated six gaps, which were labeled alphabetically around the pile starting on the southeast side (Figure 2-1). Erosional Gaps G, H, and I developed after the report was completed and have been labeled as they occurred. Areas where tailings are eroding into the river via water erosion or where tailings are in direct contact with the river were noted during the LSI. These areas are illustrated on Plate 3.

Two of the original drainage structures placed by the mining company are illustrated in Photos 7 and 18 (Appendix F). These concrete drainage structures were constructed to drain the water from off the tailings pile and divert it into Big River. During the E & E/FIT PA site reconnaissance in January 1988, it was noted that drainage structure #1 near Gap A was totally collapsed and was no longer functional. According to the UMC report, drainage structure #1 became blocked, leading to the massive erosion which occurred in 1977 at Gaps A and B. The UMC report recommended that the major erosional gaps be filled with a suitable fill material and the area be reshaped to reduce further erosion. Further, the report suggested that the drainage structure located near Gap A be altered to minimize the chance for overflow (Novak and Hasselwander 1980). As Photo 18 illustrates, no further stabilization efforts had been conducted at drainage structure #1 as of July 1990, during the LSI fieldwork.

Wind erosion and the associated blowing of lead-laden dust is also a major concern (Appendix F; Photos 3 and 4). As tailings accumulate and their angle of repose is exceeded, they collaspe and fall into the river. Wind erosion is generally from west to east, which produces a continuous movement of the tailings toward the east. Because the tailings are a very fine, dolomitic sand or silt, sufficient wind velocity creates a tailings dust cloud. During the January 1988 site reconnaissance, this occurrence was observed to be a serious problem (Photo 3). A dust plume originating from the site appeared to be transporting dust at least one mile to the southeast. Wind speeds on that day included gusts up to 35 miles per hour.

The UMC report recommended that a study be undertaken to assess the possibility for plant growth to be established on the pile to control wind erosion. Plant life is very difficult to establish in this environment for several reasons:

- o A serious nutrient deficiency exists in the tailings;
- o Wind erosion prevents establishment of seedlings;
- o Moisture cannot be retained, especially on the slopes, due to the porous nature of the tailings; and
- o The lead content of the tailings may cause plant sterilization, preventing reseeding by existing plants.

Because of these deleterious conditions, natural plant growth on the majority of the pile is almost nonexistent. Thus, experimentation was suggested as an attempt to establish a method for maintaining a vegatative cover.

The UMC report considers the on-site landfill to be a serious potential problem. The liquid runoff (leachate) that results from a landfill is typically low in pH and contains large quantities of organic material. If these conditions exist, it is very possible that heavy metals could be leached from the tailings and transported to the Big River and shallow ground water at the site. In the UMC report, tests were conducted by extracting mine tailings with nitric acid, distilled water, and ethylenediaminetetra-acetic acid (EDTA). The nitric acid extraction represents the total quantity of metals in the tailings. The distilled water extraction represents what is released by the movement of rain water through the tailings. The EDTA extraction represents the potential for extraction by landfill leachate (Table 2-2). Metals that are extracted by landfill leachate would also be chemically bound by organics and might remain in solution after entering a body of water such as the Big River. During the reconnaissance, the area where landfilling was complete and soil cover was applied was observed to be much more stable than the adjacent mines tailings. However, the benefits of soil cover are offset by the potential for landfill leachate to release lead and other metals from the tailings (Novak and Hasselwander 1980).

These three problems of water erosion, wind erosion, and the landfill are the primary concerns at the Desloge tailings pile. When the UMC report was submitted in 1980, no remedial action had begun. However, St. Joe Minerals Corporation began remedial activities in 1981.

Table 2-2
Metals Analyses of Tailings
Big River Mine Tailings Desloge, Missouri
University of Missouri-Columbia College of Engineering

	Clay (μg/g dry)			Sand (μg/g dry)		
	Water	EDTA	HNO_3	Water	EDTA	HNO_3
Lead	20	2,200	2,400	26	720	850
Cadmium	ND	3.2	14	ND	5.8	25
Zinc	3.4	220	680	14	230	1,000

Source: Novak and Hasselwander 1980

NOTE: ND: Not detected.
Water: Represents rainfall through tailings.
EDTA: Ethylenediaminetetra-acetic acid and represents landfill leachate through tailings.
HNO_3: Nitric acid and represents total metal content in tailings.

In December 1981, St. Joe Minerals Corporation began filling Gaps A, B, C, and D. This remedial action was completed in January 1982 (Mattson 1987). C.G. Mattson, St. Joe Minerals Corporation Project Manager, provided a summary of the remedial activity and maintenance performed after the initial work on Gaps A, B, C, and D to the date of the EPA PA.

According to Mattson, inspections have been performed at least once per month from December 1981 by St. Joe Minerals and/or the engineer for the landfill. Inspections also are made after or during heavy rainfall events. The inspections consists of confirming that all drainage structures are functional and that no observable defects have occurred in the retaining berm.

In April 1983, two small gaps, designated Gaps G and H, were formed when unusually heavy rainfall overtopped the retaining berm (Figure 2-1). The gaps were filled and a 22-inch steel pipe drainage structure was placed in each. In October 1984, 1,500 feet of fence was placed along the base of the large tailings pile on St. Joe Minerals property, and the area north of the fence was seeded, fertilized, and covered with straw mulch. This fence was built to reinforce a dune formed by a wind fence placed in 1980.

In April 1985, Gap I was formed when heavy rainfall topped the retaining berm. The gap was filled and a 22-inch steel pipe drainage structure was established. At the same time, 2,000 feet of snow fence was placed in the area of the break to build up the retaining berm with wind-blown material. The open channel spillway cut that drains the pond area was deepened and a diversion ditch was cut across natural ground to keep water from flowing into the Gap I area (Figure 2-1). A diversion dike was also built through natural ground so that water diverted by the landfill operation would not flow into Gap E (Figure 2-1).

In October 1985, the approximately 20 acres of tailings that comprise the major portion of the Gap I drainage area were fertilized and seeded. During the January 1988 FIT reconnaissance, it was apparent that the vegetation in this particular area was growing well and had helped stabilize the area. It should be noted that this area is flat and stable relative to other steep sloping, dune-like areas that also exist on the tailings pile. The condition of this area was similar during the July 1990 LSI.

In 1985, the Desloge tailings Task Force contracted the engineering firm Burns and McDonnel, Inc., to develop a long-term stabilization plan. The investigation and report were funded 25 percent by the landfill corporation and 75 percent by St. Joe Minerals. The Burns and McDonnel (B & M) proposal was highly criticized because it included creating several ponds on the tailings pile to control surface runoff (B & M 1987). Because of the proven instability of the tailings, the plan to create ponds on the pile was not considered a satisfactory solution. In March 1986, 10,000 Black Locust trees were planted on the Desloge tailings area; some 7,500 of them were planted in the Gap I drainage area that was sewn in October 1985. During the reconnaissance, it was apparent that the seeding of Black Locust in this area was very successful. Some trees were approximately 12 feet tall. In February 1987, 15,000 Black Locust trees were planted on the approximately 15 acres of tailings that form the drainage area for Gap G. These areas were inspected during the LSI, and the vegetation attempts appear to be successful in the Gap I area and moderately successful in the Gap G area.

In September and October 1987, some 20,000 feet of wind fencing was installed on the upper portion of the tailings area. During the FIT reconnaissance it was noted that much of this fencing was damaged or blown down due to a recent storm. Reconstruction of the fencing, as well as reinforcement, were planned. It was obvious that the wind fencing was controlling some movement of the sand-like material, but it is ineffective during stronger winds (Mattson 1987). It should be noted that at the time of the LSI, most of the wind fencing was damaged and, therefore, ineffective.

In April 1987, the Soil Convervation Service proposed some stabilization plans for the site to the Desloge Mine Tailings Task Force. They suggested diverting the surface drainage away from critical erosion areas and planting some test plots to determine what methods might be best for revegetation. Plans in 1988 were to carry out revegetation test plot experiments in an attempt to determine what plants and planting methods are best suited to the mine tailings. No known further stabilization efforts had been completed or undertaken during the period from the 1988 PA to the 1990 LSI activity. No additional areas were vegetated and it was noted during the LSI that most of the wind fencing was in need of repair.

2.4 SITE CONTACTS

Persons associated with the operation and regulation of the site include the following:

Marvin Hudwalker
Professional Engineer
Hudwalker and Associates, Inc., Consulting Engineers
Farmington, Missouri
(314)756-6775

Bryant AuBuchon
Landfill Manager
St. Francois County Environmental Corporation
Desloge, Missouri
(314)431-4768

C.G. Mattson
Project Manager
St. Joe Minerals Corporation
Irvine, California
(714)975-5269

Greg Reesor
Superfund Contact
U.S. EPA
726 Minnesota Avenue
Kansas City, Kansas
(913)551-7695

Also see Appendix C for additional site contacts and property owners associated with the site sampling.

SECTION 3: PAST INVESTIGATIONS

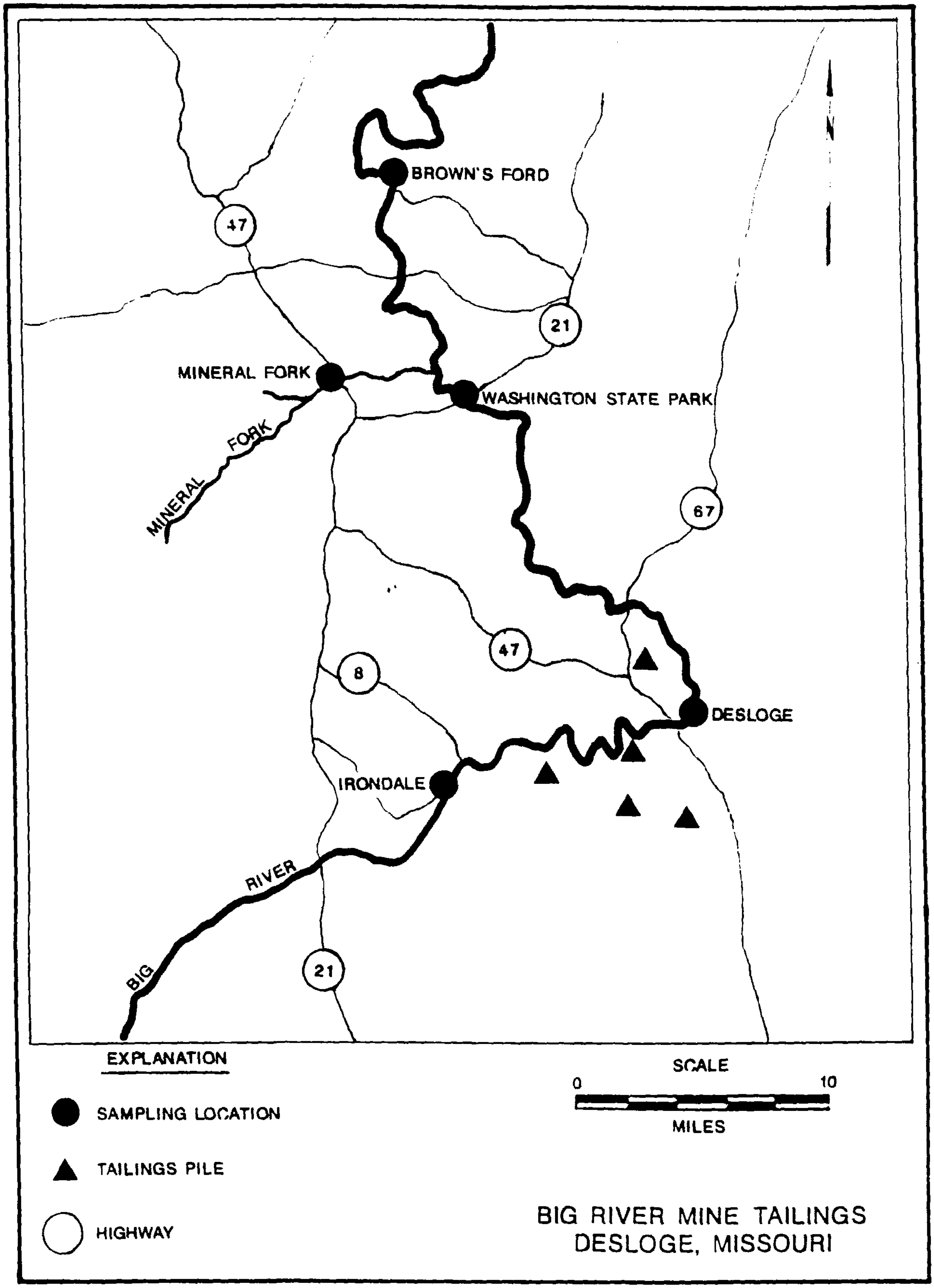
Numerous investigations regarding the effects of mine tailings on the Big River have been completed since the massive erosional event in 1977. This section will address the significant results of this research.

3.1 METALS IN BIG RIVER WATER AND SEDIMENT

In a study conducted by the National Fisheries Research Laboratory (NFRL), the metals content in river water and sediment was measured at different locations along the Big River (Figure 3-1). The Irondale and Mineral Fork sampling locations were considered control areas while Desloge, Washington State Park, and Brown's Ford sites are 5 miles, 37 miles, and 60 miles, respectively, downstream from the Desloge Mine tailings pile.

Water sampling was done during low, medium, and high stream flow. Total metals and dissolved metals were measured for lead, cadmium, and zinc. The highest total lead (0.68 milligrams/liter [mg/l]) occurred at Washington State Park, and the highest dissolved lead (0.026 mg/l) occurred at Brown's Ford (Table 3-1).

Sediments samples were collected from corresponding locations on the Big River (Table 3-2). Total sediment lead concentrations were highest in Desloge (2215.0 milligrams/kilogram [mg/kg]) and tended to decrease with distance downstream. This value is similar to the lead content found in the tailings at the Desloge pile. Total lead concentration was lowest (49.6 mg/kg) at Irondale. Concentrations at Mineral Fork were substantially higher than at Irondale, though they were lower at Mineral Fork than at other locations. This is probably attributable to the past lead mining or ongoing barite mining activities in the Mineral Fork watershed. These sampling results show how the mine tailings had affected the benthic zone of the Big River at the Desloge mining pile and for several miles downstream (Table 3-2; Schmitt 1982).



WASTE SITE TRACKING #: MOO616
PREPARED BY: R. OVERFELT

ECOLOGY & ENVIRONMENT APRIL 1988
SOURCE: SCHMITT 1982

Figure 3-1 NFRL Study Sample Locations on Big River

Table 3-1
Metals Concentrations in Water Samples Collected
in the Big River
Big River Mine Tailings Site
Desloge, Missouri

Location/ Stage	Flow (CFS)	Lead D	Lead T	Cadmium D	Cadmium T	Zinc D	Zinc T
Mineral Fork							
Low	29.6	0.005	0.009	0.001	0.001	<0.01	<0.01
Med.	160.0	0.006	0.005	0.001	0.001	<0.01	<0.01
High	505.0	0.005	0.009	0.001	0.001	<0.01	<0.01
Brown's Ford							
Low	95.6	0.005	0.043	0.001	0.001	0.02	0.03
Med.	650.0	0.007	0.084	0.001	0.001	0.01	0.03
High	11900.0	0.026	0.440	0.001	0.001	0.05	0.17
Washington State Park							
Low	70.2	0.009	0.091	<0.001	0.001	0.01	0.04
Med.	490.0	<0.005	0.140	<0.001	<0.001	0.01	0.07
High	11395.0	0.021	0.680	<0.001	<0.004	-.--	0.22
Desloge							
Low	45.3	0.020	0.041	0.002	0.004	0.31	0.36
Med.	298.0	0.010	0.085	0.001	0.001	0.06	0.11
High	932.0	0.012	0.110	0.002	0.004	0.10	0.16
Irondale							
Low	7.1	0.005	0.005	0.001	0.001	<0.01	<0.01
Med.	160.0	0.005	0.005	0.001	0.001	<0.01	<0.01
High	300.0	0.005	0.005	0.001	0.001	<0.01	<0.01

Source: National Fisheries Research Laboratory Report (Schmitt 1982).

Note: CFS = Cubic feet per second.
D = Dissolved Metals.
T = Total Metals.
Reporting unit is mg/l.

Table 3-2
Metals Concentrations in Sediment Samples
Collected in the Big River
Big River Mine Tailings Site, Desloge, Missouri

Location	Lead	Cadmium	Zinc
Irondale	49.6	1.62	64.9
Desloge	2,215.0	29.96	1,658.4
Washington State Park	1,843.4	10.79	704.3
Brown's Ford	1,438.3	6.55	484.5
Mineral Fork	291.5	2.52	369.7

Source: National Fisheries Research Laboratory Report (Schmitt 1982).
NOTE: Adjusted total sediment metals concentrations (ug/g dry weight).

3.2 METALS IN AQUATIC BIOTA

Several past studies have focused on the elevated metal levels in the Big River aquatic biota.

In the report prepared by the NFRL, cray-fish, fresh water mollusks, and fish were sampled. The sample locations were the same as for surface water and sediments. In crayfish samples, lead and cadmium levels were elevated at Desloge, Washington State Park, and Brown's Ford. The highest lead concentration (140 micrograms/gram [μg/g]) occurred at Desloge. The lead concentration in crayfish was 1.4 μg/g at Irondale and 2.7 μg/g at Mineral Fork. Since crayfish feed on aquatic macrophytes and detritus, they can accumulate sediment-bound toxins.

Pocketbook mussels were collected at all the locations except Desloge, where none could be found. Results were listed by mean concentrations. Results showed the highest mean lead concentrations at Brown's Fork ranging from 310 to 490 μg/g in soft tissue and 18 to 19 μg/g in the shell. Lead levels at Washington State Park were from 200 to 310 μg/g in soft tissue and 8 to 22 μg/g in the shell. The control sample at Irondale had mean lead levels of 2.16 μg/g in soft tissue and 0.76 μg/g in the shell.

The results of fish samples collected in the Big River vary with fish types (Table 3-3). Bottom-feeders, such as catfish and the Redhorse sucker, tended to have higher concentrations of metals than fish such as the smallmouth bass that do not feed on bottom sediment.

Table 3-3
Metals Concentration in Edible Portions
of Fish in the Big River
Big River Mine Tailings, Desloge, Missouri

Location/ Species	Lead	Cadmium	Zinc
Mineral Fork			
Smallmouth bass	0.19	0.01	13.97
Yellow bullhead	0.13	0.02	5.67
Redhorse sucker	0.08	0.01	13.42
Brown's Ford			
Smallmouth bass	0.21	0.01	4.50
Flathead catfish	0.29	0.02	12.24
Redhorse sucker	0.63	0.01	11.67
Washington State Park			
Smallmouth bass	0.27	0.01	9.49
Flathead catfish (4)	12.00	0.34	23.00
Redhorse sucker	0.43	0.01	9.38
Mixed suckers	0.38	----	----
Desloge			
Smallmouth bass	0.05	0.01	11.73
Channel catfish	0.13	0.03	5.12
Redhorse sucker	0.57	0.03	16.15
Mixed sucker	0.79	----	----
Irondale			
Smallmouth bass	0.01	<0.01	13.28
Flathead catfish	0.06	0.06	6.75
Redhorse sucker	0.02	0.01	9.32
Mixed sucker	0.07	----	----

Source: National Fisheries Research Laboratory Report (Schmitt 1982).

NOTE: Means of two samples (individual fish) unless otherwise indicated.
Reporting unit is ug/g wet weight.

The lead content in the Redhorse sucker was greater than the 0.3 µg/g dietary limit recommended by the World Health Organization (WHO): 0.57 µg/g at Desloge, 0.43 µg/g at Washington State Park, and 0.63 µg/g at Brown's Ford. The lead concentrations at Irondale and Mineral Fork were well below the WHO limit (Table 3-3; Schmitt 1982.)

Research conducted on fish over a five-year period by the University of Missouri-Rolla (UMR) confirms there results. UMR research shows that over a five-year period, the lead concentrations in suckers from the Big River near the lead tailings pile have consistently exceeded the WHO limit (Gale et al. 1982).

These results suggest that mine tailings have raised lead levels in the benthic zone of the Big River and in the bottom feeders that live in this zone of the river. This study also suggests that the tailings have had little effect on the heavy metals content in the river water. However, the LSI sampling results have determined that the surface water in Big River does contain elevated levels of metals which are attributable to the site.

3.3 MINE TAILINGS FOR USE AS AGRICULTURAL LIME

UMR research determined that the possible use of mine tailings as agricultural lime may be acceptable. It also stated that caution should be taken because some older tailings piles have much higher concentrations of lead than more recently developed piles. It should also be noted that plant uptake studies have indicated that both lettuce and radishes tend to accumulate some lead and cadmium when tailings were mixed with soil as agricultural lime (Wixon et al. 1983).

3.4 PARTICULATES IN AMBIENT AIR FROM TAILINGS IN AREA

MDNR collected air quality data near Flat River, Missouri, approximately two miles southeast of the site. MDNR used one Hi-vol sampler located approximately 2,000 feet north of the St. Joe Park Tailings Pile (Federal Pile) near Flat River (Plate 1). Data was collected for a three-year period, 1981 to 1983. Monitor filters taken during the initial sampling period of January through August 1981 were analyzed for lead. They were analyzed for total suspended particulates only. No additional filters in the three-year period were analyzed for lead. The total suspended particulate (TSP) annual geometric mean in 1981 was 50.55 micrograms/cubic meter ($\mu g/m^3$); 1982 was 35.47; and 1983 was 47.43 $\mu g/m^3$ (MDNR 1981). The National Ambient Air Quality Standard (NAAQS) for the annual geometric mean of TSP is 75 $\mu g/m^3$ (CFR 1987). The results of the lead analyses for the first three quarters of 1981 were January to March 0.14 $\mu g/m^3$, April to June 1.09 $\mu g/m^3$, and July to August 0.17 $\mu g/m^3$ (MDNR 1981). The NAAQS primary standard for lead in a calendar quarter is 1.5 $\mu g/m^3$ (CFR 1987). These results are all within the standards for air quality and are adequate for southerly winds. Because the prevailing winds in this part of the country vary from season to season or month to month, additional Hi-vol monitoring devices situated around the tailings pile would have been more effective than one unit (USDC 1979). A background or control Hi-vol sampler was not used; therefore, no control data is available for comparisons. The Hi-vol air monitoring data collected during the LSI included a much more complete study and analysis. These results are discussed in Section 7.4.

3.5 E & E/FIT PREVIOUS INVESTIGATIONS

PA site reconnaissance was conducted in January 1988. Site conditions at that time were documented in the PA report submitted May 17, 1988, to EPA. Much of the background material from the PA has been updated and is included in this report. During the PA reconnaissance, 35 mile per hour westerly winds were observed transporting tailings material off site. Photographs taken during this PA thoroughly document this air release.

A limited site investigation that included surface sampling of the tailings and background soils was conducted May 16, 1988. Nine samples, including a duplicate, were collected on site, and three background soil samples were collected near a gravel road 2.5 miles northwest of the site. Concentration ranges of on-site samples were 880 to 1,400 mg/kg of lead, 8.4 to 19 mg/kg of cadmium, and 370 to 1,100 mg/kg of zinc. Concentrations of background samples were 410 to 570 mg/kg of lead, undetected cadmium, and 97 to 99 mg/kg of zinc. Tailing concentrations were elevated above these background samples; however, the background concentrations were considered very high. This probably is due to the collection of the background samples adjacent to a gravel road. Tailings are used for road material in the area; therefore, dust from the road may have elevated the adjacent soil. The LSI sampling yielded much lower metals concentrations in background surface soil.

SECTION 4: SUMMARY OF WASTE SOURCE AND CHARACTERISTICS

It has been determined that the 600-acre mine tailings located at the Big River Desloge Tailings site contain significant amounts of lead, cadmium, and zinc. The tailings from the pile are migrating into the river and ambient air via water and wind erosion. Therefore, these heavy metals constituents are contaminating the river, air, and possibly the ground water. This section will discuss the three heavy metals of primary concern (lead, cadmium, and zinc), their characteristics, potential hazards, and relevant EPA Maximum Contaminant Levels (MCL). Detailed waste characteristics for these metals as well as arsenic, cobalt, and nickel are included in Appendix I.

Lead exists in nature mainly as lead sulfide (galena). Other common forms are lead carbonate (cercissite), lead sulfate (anglesite), and lead chlorophosphates (pyromorphite). Stable complexes result from the interaction of lead with the sulflydryl, carboxyl, and amine coordination site found in living matter. The toxicity of lead in water is affected by pH, hardness, organic materials, and the presence of other metals. The aqueous solubility of lead ranges from 500 micrograms/liter (μg/l) in soft water to 3 μg/l in hard water (EPA 1976).

Lead is a toxic metal that tends to accumulate in the tissues of humans and other animals. Although seldom seen in the adult population, irreversible brain damage is a frequent result of lead intoxication in children. This most commonly results from the ingestion of lead-containing paint found in older homes. The major toxic effects of lead include anemia, neurological dysfunction, and renial impairment. The most common symptoms of lead poisoning, which usually develop slowly, are anemia, severe intestinal cramps, paralysis of nerves (especially the arms and legs), loss of appetite, and fatigue. The MCL established for lead in drinking water is 50 μg/l and proposed 5 μg/l (EPA 1991). The National Ambient Air Quality Primary Standard for lead in the air in a calendar quarter is 1.5 $\mu g/m^3$ (CFR 1987).

Cadmium occurs mainly as a sulfide salt, frequently in association with zinc and lead ores (EPA 1976). Accumulation of cadmium in soils in the vicinity of mines and smelters may result in high local concentrations in nearby waters. Cadmium is deposited and accumulated in various body tissues. Cadmium may function in or may be an etiological factor for various human pathological processes including testicular tumors, renal dysfunctions, hypertension, arteriosclerosis, growth inhibition, chronic diseases of old age, and cancer (EPA 1976). The MCL established for cadmium in drinking water is 10 µg/l and proposed at 5 µg/l (EPA 1991).

Zinc is usually found naturally as a sulfide, and it is often associated with other metals, especially lead, copper, cadmium, and iron. It is used in galvanizing processes and in preparation of alloys. Zinc is essential and beneficial in human metabolism. Community water supplies tested have contained 11 to 27 mg/l without harmful effects. The toxicity of zinc compounds to aquatic animals is modified by environmental factors. An increase in temperature and reduction in dissolved oxygen increases the toxicity of zinc for fish. Toxic concentrations of zinc compounds cause adverse changes in the morphology and physiology of fish (EPA 1976). No primary MCL for zinc has been established.

Arsenic, nickel, and cobalt were also detected in the ground water near the on-site landfill. The MCLs for arsenic and nickel are 50 µg/l and 100 µg/l, respectively. No MCL for cobalt has been established.

Mean concentrations of lead, cadmium, zinc, cobalt, nickel, and arsenic were calculated from the fourteen tailings samples collected on site during the 1990 LSI. Mean concentrations are 2,215 mg/kg lead, 21.7 mg/kg cadmium, 1,044 mg/kg zinc, 15.4 mg/kg cobalt, 15.8 mg/kg nickel, and 7.6 mg/kg arsenic.

The tailings area has been established to be approximately 600 acres. The average thickness of the tailings is approximately 46 feet based on an evaluation of contours from a 1908 USGS map (before tailings deposition) compared to the current topographic elevation. Well logs also verify that the tailings are approximately 50 feet thick. Therefore, the overall volume of waste was calculated to be approximately 44,528,000 cubic yards.

SECTION 5: PHYSICAL AND CULTURAL SETTING

5.1 SITE VICINITY AND AIR PATHWAY CONSIDERATIONS

There are several people working on site and numerous people residing in the area surrounding the site. The landfill operation employs four full-time personnel. The Morgan and White facility has three full-time employees and may have up to five during April to Septem-ber. Therefore, there are seven people that work on site year round. The nearest individual residing off site is at the Kyle residence, located 100 feet south of the southwest side of the site.

Population of the surrounding site area was determined using topographic maps, aerial photographs, US Census Bureau data, and the Graphical Exposure Modeling System (GEMS). Table 5-1 lists these results.

Table 5-1
Population Surrounding the Site in Four-mile Radius

Distance from site (miles)	Population
0 - 1/4	52
1/4 - 1/2	235
1/2 - 1	2,399
1 - 2	11,443
2 - 3	6,469
3 - 4	238

Sources: USGS 1982, St. Francois 1983, EPA 1989, U.S. Census 1991

Resources in the area include the adjacent Big River and commercial agriculture. The Big River is recognized by MDNR for uses that include livestock watering, wildlife watering, swimming, boating, and aquatic life (fishing etc.) (Howland 1988). The E & E/FIT observed numerous individuals fishing and swimming in Big River at and downstream of the site. It should also be noted that during the LSI, it was determined that landfill employees had recently built an access road on site leading to a large tailings sandbar that employees use for swimming and fishing. This area is located on the west side of the meander area and is illustrated on Plate 3. Howard Wood owns the farm that lies across the river on the east side of the site. Wood uses the land for livestock grazing and hay production. Wood stated that he does not need to apply agricultural lime to his fields due to the significant amount of tailings that blow from the site and are deposited on his property. No terrestial or aquatic sensitive environments exist within a four-mile radius of the site (Dickniete 1990).

5.2 TOPOGRAPHY AND SURFACE WATER CONSIDERATIONS

The Big River Mine Tailings site lies on the eastern side of the Ozark highlands in St. Francois County, Missouri. The major physical features in the area are the St. Francois Mountains to the south, the Farmington Plain to the east, and the dissected topography of the Salem Plateau located to the north (SCS 1981). The site is between these major features on the floodplain of the Big River.

The Big River Mine Tailings site is a mounded pile of tailings that slopes from the middle toward the river boundary. Therefore, drainage on the east, north, and west sides of the site is directly into Big River. Section 3 discusses in detail site drainage as well as past and present problems. Refer to the detailed topographic map of the site included in Appendix H for specific site drainage patterns. Some of the drainage on the south end of the site enters the on-site tunnel and is transported to Big River.

The majority of the site is bordered by Big River. There are numerous areas along this perimeter where tailings constantly erode into the river. Therefore, the tailing wastes are easily transported to the river and in many areas are continuously in contact with the river.

The tailing material is processed dolomite powder, silt, and sand-sized material. Because the tailings are very porous and permeable, they will not retain water through infiltration. Also, tailings are devoid of organic nutrients. Therefore, plant growth is very difficult. Most of the site is unvegetated.

The Soil Conservation Service describes the majority of the site as Psamments soils. This unit consists of deep, nearly level to gently rolling, excessively drained, newly formed soil in tailings ponds. These soils are formed in crushed dolomite material from lead mining. Permeability is rapid, and surface runoff is slow to medium although most precipitation is absorbed into the surface. The available water capacity is low. The natural fertility is very unbalanced, and careful fertilization is required to make the soil suitable for any plant growth. The organic matter is also very low. Some areas have been seeded to grasses and legumes, but results are poor. These soils are generally unsuitable for growing grasses, shrubs, and trees, unless intensively managed (SCS 1981).

The area where natural vegetation occurs on site consists mainly of Caneyville silt loam except for a small area on the southwest portion of the site where Gasconade, flaggy, silty, clay loam occurs.

Caneyville silt loam has 2 to 5 percent slopes and is moderately deep and well drained. This soil occurs on convex ridgetops. The surface layer is a dark-brown silt loam about five inches thick. Surface runoff is slow to medium. Available water capacity is low (SCS 1981).

Gasconade flaggy, silty, clay loam has 9 to 35 percent slopes, is excessively drained, and occurs on uneven side slopes. The surface layer is a very dark-brown flaggy, silty, clay loam about eight inches thick. The subsoil is dark-brown very flaggy, silty, clay about five inches thick. Permeability is moderately slow, and surface runoff is rapid. Available water capacity is very low (SCS 1981).

All of the soils on site are underlain by hard-bedded Bonneterre dolomite (SCS 1981).

As stated in Section 5.1, the Big River is officially recognized for uses that include swimming, boating, fishing, livestock watering, and wild-life watering (Howland 1988). E & E/FIT observed many local individuals swimming and fishing in the Big River at the site and downstream. There are no drinking water intakes on Big River within 15 miles downstream of the site. However, there is an intake on Big River in Jefferson County, at least 60 river miles from the site (Price 1991).

There are no sensitive environments or critical habitats within one mile downstream of the site (Dickniete 1990).

5.3 HYDROGEOLOGY AND GROUND WATER CONSIDERATIONS

The regional and site specific hydrogeology is very complex due to the past mining activities. Hundreds of miles of abandoned underground mine shafts are now filled with ground water. It is estimated that 100,000 exploratory borings were also drilled in the Old Lead Belt (USGS 1988). It is assumed that most of these borings were never properly sealed. Consequently, the mining activity in the region has significantly altered ground water flow and has left the ground water more susceptible to contamination. A comprehensive, regional ground water study was beyond the scope of the LSI. However, the USGS office in Rolla, Missouri, is currently conducting a ground water study of the site and surrounding area.

The shallow ground water on site was characterized during the LSI using several sampling methods. This included sampling of monitoring wells, installing and sampling Geoprobe temporary wells, sampling springs, and sampling artesian wells. It was determined that the shallow ground water is in contact with the tailings. Monitoring wells drilled to the base of the tailings directly around the landfill had static water level (SWL) measurements ranging from 30.5 to 45.75 feet below the ground surface. These monitoring wells (UG-1, DG-3, and DG-2) were emplaced in areas where the tailings are thickest. Monitoring well DG-5, located at a lower elevation near the Big River, had a SWL of 4.25 feet below the ground surface. When the SWL is compared to the total depth of the well, which is drilled to the base of the tailings, it is apparent that shallow ground water is in contact with the tailings. Well logs for the monitoring wells are included in Appendix G. Four Geoprobe temporary wells had SWLs ranging from 9 to 12 feet below the ground surface. It can also be concluded from these SWL measurements that the shallow ground water is in contact with the tailings. This is also confirmed by the numerous springs or seeps found along the perimeter of the site and Big River boundary. Several of these springs were sampled during the LSI.

Several artesian wells located approximately 800 to 1000 feet west of the southwest border of the site were sampled. The wells are actually unsealed exploratory borings. The surface contact of these wells is topographically 60 to 80 feet lower than the southwest side of the site. Results from the samples collected indicated that contaminated shallow ground water from the site is influencing these artesian wells. Results from all of the ground water samples collected are discussed in Section 7.3.

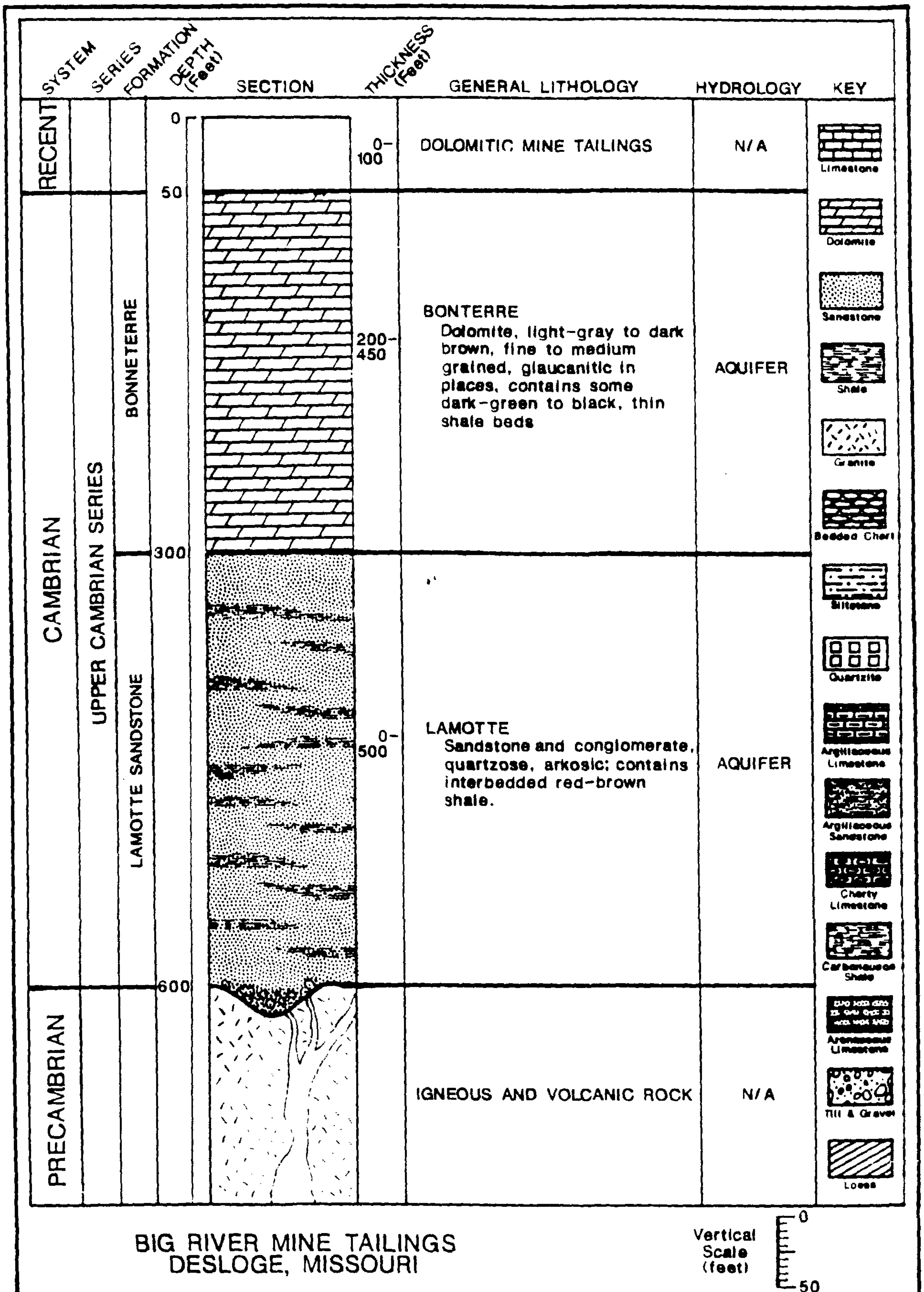
The site is underlain by Precambrian-age felsites and granites, which are overlain by rock units of the Upper Cambrian series (Buckley 1908; MDGSWR 1961). Figure 5-1 depicts the general stratigraphy of the site vicinity.

The Upper Cambrian Series rock units consist of in ascending order the Lamotte Formation; the Bonneterre Formation; the Elvins Group, which contains the Davis and Derby-Doerun formations, and the Potosi and Eminence formations. The Elvins Group and the Potosi and Eminence formations will not be considered in this report because they are topographically higher than the Big River Mine Tailings site (Buckley 1908; MDGSWR 1961).

The Lamotte Formation is predominantly a quartzose sandstone that grades laterally in many places into arkose and conglomerate (MDGSWR 1961). The formation is approximately 300 feet thick in the study area (Buckley 1908). The Lamotte aquifer is a regional drinking water source (MDGSWR 1983).

The Bonneterre Formation is typically a light-gray, medium to fine-grained, medium-bedded dolomite, although it consists of relatively pure limestone in some areas (MDGSWR 1961). The formation is approximately 350 feet thick in the study area and the principal source for the lead mining in the area that occurred in the late 19th and early to mid 20th centuries. The Bonneterre aquifer is also a regional drinking water source (MDGSWR 1983).

The area ground water aquifers that are topographically lower than the site are the Bonneterre and Lamotte formations. The Flat River Water District serves the towns of Desloge, Elvins, Flat River, Leadington, River Mines, and Ester, Missouri. The approximate population served is 11,000. The Big River Mine Tailings site is adjacent to the town of Desloge and is within two miles of Flat River. The Flat River Water District's water supply comes from the Bonneterre Formation via a sealed, abandoned mine shaft, located approximately two miles south of the site in River Mines, Missouri; and from the Lamotte Formation, via a



WASTE SITE TRACKING NO.: MO0616 ECOLOGY & ENVIRONMENT FIT APRIL 1988
PREPARED BY: C. WILLIAMS SOURCE: MDGSWR 1961

Figure 5-1: Generalized Stratigraphic Column

well located approximately 3,000 feet east in Desloge, Missouri, that is pumped from 410 feet.

The typical shallow ground water flow around the site is assumed to be toward the river. Several springs around the site area flow into the Big River.

An unknown number of private drinking water wells are used in the area. The nearest drinking water well is located on site at the landfill office. This well is reported to be 216 feet deep. Sample results (sample 307) indicate that water from this well is also being influenced by the site (Section 7.3).

Other municipalities that use ground water for drinking and are within a four-mile radius of the site include Leadwood, Bonne Terre, and Terre DuLac. Table 5-2 lists information on municipal wells in the area.

Table 5-2
Municipal Ground Water Usage
in Four-Mile Radius
Big River Mine Tailings site
Desloge, Missouri

Water District	Munici-palities Served	Popu-lation Served	Well Identific-ation	Total Depth (feet)	Formation	Distance From Site
Flat River	Flat River Desloge Elvins Leadington Ester River Mines	4,443 3,581 1,548 238 1,038 414	#1 Sealed mine shaft #2	432 410	Bonneterre Lamotte	~ 2 miles 3000 ft.
Lead-wood	Leadwood Gumbo	1,371 ~ 90	#1 #2	700 790	Unknown Unknown	~ 2.5 miles ~ 2.5 miles
Bonne Terre	Bonne Terre E Bonneterre	3,797	#1 #2	746 720	Lamotte Lamotte	~ 1.5 miles ~ 1.5 miles
Terre DuLac	Terre DuLac	~2,000	#1 #2 #3	1,030.5	Unknown Unknown Unknown	~ 3.5 miles ~ 3.5 miles ~ 3.5 miles

Sources: Tille 1988; Hedgeworth 1988; Warren 1988; Johnson 1987a; Degonia 1988.

SECTION 6: FIELD ACTIVITIES

The Big River Mine Tailings LSI field work was conducted August 21 through 29, 1990. Sample series #CSXCR was assigned to all samples. The E & E/FIT members and their field assignments were: Bob Overfelt, team leader and sampler; Chris Williams, Site Safety Officer and sampler; Sharon Martin, sampler; Curt Enos, sampler and HRS information; Annette Sackmann, air sampling trainer; Otavio Silva, air sampler; Patty Roberts, air sampler; and Wes McCall, air sampler.

The field activities varied slightly from the work plan; the number of samples collected was increased substantially. Because of the size of the site and the other tailings piles in the surrounding area, it was necessary to increase the number of samples in order to fully characterize the site and help establish attribution.

Additional soil and tailings samples were added in order to characterize the soil at each Hi-vol air sampler location and to more accurately establish average background concentrations.

Sediment and surface water samples were added to help establish attribution. Therefore, several more samples were collected upgradient and downgradient of the site. Also, any major tributary that could contribute significantly to the water quality of Big River was sampled.

Additional ground water samples were taken to better characterize the shallow ground water on site and in the vicinity. The Geoprobe was used to install four temporary wells along the north perimeter of the site. Numerous springs were found and sampled along the river bank at the site. Some private wells adjacent to the site were also sampled.

The number of air samples was increased because one additional Hi-vol was used and the sampling period was extended from five to six days.

Additional Quality Assurance/Quality Control (QA/QC) samples were also submitted in order to meet the necessary requirements. All sampling was conducted in accordance with the Region VII E & E/FIT Quality Assurance Project Plan. All samples were submitted for total metals analyses. Water samples were also submitted for dissolved metals analyses. All samples were delivered to EPA Region VII Laboratory on July 30, 1990.

6.1 SOIL AND TAILINGS SAMPLING

Thirty samples were collected on site and in the surrounding area. Samples are summarized in Table 6-1, and locations are depicted on Plates 1 and 3. Fourteen tailings samples, including one duplicate, were collected on site. A soil sample was collected at each of the four off-site Hi-vol locations. Five background soil samples, including a duplicate, were collected from three locations several miles west of the site. Four soil samples were collected from three private residences and a day care center, all of which are within 1,500 feet of the southern site border. Four soil samples were collected at intermediate distances (one to two miles) around the site.

The majority of the samples (001 through 026 and 030) were composite samples consisting of five aliquots, one collected every 3 feet over a 15-foot linear distance. All of these samples were collected with a stainless steel spoon at a depth of 0 to 6 inches.

Samples 027, 028, and 029 were collected from a boring at surface sample location 009 at depths of 5 to 6 feet, 10 to 11 feet, and 15 to 16 feet, respectively. These samples were collected using the Geoprobe and the Probe-drive soil sampler.

6.2 SEDIMENT AND SURFACE WATER SAMPLING

Because sediment and surface water samples were collected concurrently at the same sampling location, they will be discussed together. Surface water samples were collected first to avoid introducing disturbed sediment into the water. There were 21 sampling locations, including one duplicate sample location; 22 surface water and 22 sediment samples were collected. Sediment samples are summarized in Table 6-2, and surface water samples are summarized in Table 6-3. Plates 2 and 3 illustrate the sampling locations. Two background locations on the Big River were sampled several miles upstream of the site: one on the tributary that drains the Leadwood tailings pile and one downgradient of the Leadwood tributary and upgradient of the site. Two locations were sampled on Owl Creek. Eight locations, including a duplicate, were sampled on Big River where the site borders the river. Five locations downgradient of the site on Big River were also sampled. A location was sampled on Flat River, Terre Bleue Creek, and Turkey

Table 6-1

Soil and Tailings Sample Summary

Big River Mine Tailings Site

Desloge, Missouri

E & E/FIT; July 1990

Sample Series CSXCR

Sample #	Location	Property Owner
001	From residence ~750 ft S of SW edge of site	Kennedy
*002	On site near center of river meander area	County
*003	On site in SW section of river meander area	County
*004	On site in W central section of river meander area	County
*005	On site in N central section of river meander area	County
*006	On site in NE section of river meander area at hi-vol 3 location	County
*007	On site in E central section of river meander section	County
*008	Duplicate of sample 007	County
*009	On site in SE section of river meander area	County
*010	On site in SE section of site	County
*011	On site S central section at hi-vol 4, near landfill office	County
012	Background ~4 miles W of site at hi-vol 7 location	Glore
013	~1 mile W/SW of site at hi-vol 6 location	Pratte
014	~1.25 miles E of site at hi-vol 5 location	Callahan
015	~1,500 ft E of site at hi-vol 1 and 2 locations	Wood
016	~2 miles W of site at SE corner of Leadwood Cemetery	Banks
017	Background ~6 miles NW of site and 0.25 mile S of Hwy. 47	Stoffel
018	Background ~4.5 miles NW of site in Terre Du Lac Development	Whitehead
019	Duplicate of sample 018	Whitehead
020	Background ~6 miles W of site ~1,000 ft NW of Huff Cemetery	Valley
*021	On site at leachate seep area at S edge of property near well DG-3	County
022	~100 ft S of site near landfill office	Kyle
023	~2 miles E of site and ~0.5 mile E of Big River/Flat River confluence	Bullock
024	~0.75 mile N of site and ~1 mile S of Bonne Terre	McDowell
025	~2,000 ft W of site near Murrill Cemetary	Weible
026	From Day Care Center playground ~1,500 ft S of site	Forrester
*027	On-site boring ~150 ft E of met station, 5 to 6 ft depth	County
*028	On-site boring ~150 ft E of met station, 10 to 11 ft depth	County
*029	On-site boring ~150 ft E of met station, 15 to 16 ft depth	County
030	~1,000 ft SE of site at SW corner of Oak and 8th streets	Goff

* Tailings Sample

Note: All samples were composite samples consisting of five aliquots and were collected from a depth of 0 to 6 inches except samples 027, 028, and 029. These samples were collected with the Geoprobe from an on-site boring at varying depths. All samples were requested to be analyzed for total metals. See Plates 1 and 3 for sample locations. See Appendix C for addresses of property owners.

Table 6-2

Sediment Sample Summary

Big River Mine Tailings Site

Desloge, Missouri

E & E/FIT; July 1990

Sample Series CSXCR

Sample #	Location
100	Background from Big River at Hwy. U bridge ~0.5 mile W of Irondale
101	Background from Big River ~1 mile downstream of the Hwy. 8 and Big River intersection
102	From tributary to Big River that drains Leadwood tailings pile, taken N of Leadwood ~800 ft upgradient of Big River confluence (stainless steel spoon)
103	From Big River ~1 mile downstream of Leadwood river access
104	From Big River on W side of site at W bend in river ~600 ft downstream of W Desloge river access
105	From Big River on W side of site ~0.5 mile downstream of W Desloge river access
106	From Big River on NW side of site at swimming area
107	From Big River on NE side of site ~0.9 mile downstream of swimming area (collected with shovel)
108	From Big River on E side of site ~0.5 mile upstream of major collapse area
109	From Big River on E side of site where major collapse occurred in 1977
110	From Owl Creek on N side of abandoned RR spur (collected with spoon)
111	From Owl Creek ~30 ft upgradient of Big River confluence (collected with spoon)
112	From Big River ~3,500 ft downstream of major collapse area (collected with shovel)
112D	Duplicate of sample 112
113	From Big River ~1,500 ft upstream of the N Desloge river access (collected with shovel)
114	From Big River ~0.75 mile upstream of the Hwy. 67 bridge over Big River (collected with shovel)
115	From Flat River ~300 ft upgradient of the Big River confluence (collected with spoon)
116	From Big River ~5 miles downgradient of the site and ~2.75 miles downstream of Flat River confluence
117	From Turkey Creek ~1,500 ft upgradient of the Big River confluence (collected with spoon)
118	From Terre Bleue Creek ~750 ft upgradient of the Big River confluence (collected with spoon)
119	From Big River ~10 miles downstream of the site and ~2.5 miles downstream of the Hwy. K bridge
120	From Big River ~15 miles downstream of the site and ~0.5 mile upstream of the Hwy. E bridge

Note: All samples were composite samples consisting of three aliquots and collected from a depth of 0 to 6 inches. Samples were collected with an Eckman Dredge unless otherwise noted. All samples were requested to be analyzed for total metals. All samples were collected on the waterway or from public access points. A corresponding 200-series surface water sample was collected at every sediment location (Table 6-3). See Plates 2 and 3 for sample locations.

Table 6-3
Surface Water Sample Summary
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample #	Cond (µmhos)	pH	Temp (°C)	Location
200	170	6.96	24	Background from Big River at Hwy. U bridge ~0.5 mile W of Irondale
201	170	7.23	27	Background from Big River ~1 mile downstream of the Hwy. 8 bridge and Big River intersection
202	550	7.20	26	From tributary to Big River that drains Leadwood tailings pile, taken N of Leadwood ~800 ft upgradient of Big River confluence
203	200	7.48	25	From Big River ~1 mile downstream of Leadwood river access
204	290	7.27	23	From Big River on W side of site at W bend in river ~600 ft downstream of W Desloge River access
205	280	7.63	23	From Big River on W side of site ~0.5 miles downstream of W Desloge River access
206	260	7.42	25	From Big River on NW side of site at swimming area
207	380	7.33	28	From Big River on NE side of site ~0.9 mile downstream of swimming area
208	360	7.44	29	From Big River on E side of site ~0.5 mile upstream of major collapse area
209	370	7.45	29	From Big River on E side of site where major collapse occurred in 1977
210	550	7.33	18.5	From Owl Creek on N side of abandoned RR spur
211	245	7.60	26	From Owl Creek ~30 ft upgradient of Big River confluence
212	290	7.29	25	From Big River ~3,500 ft downstream of major collapse area
212D	290	7.29	25	Duplicate of sample 212
213	290	7.55	26	From Big River ~1,500 ft upstream of the N Desloge river access
214	350	7.31	23	From Big River ~0.75 mile upstream of Hwy. 67 bridge over Big River
215	550	8.0	23	From Flat River ~300 ft upgradient of the Big River confluence
216	340	7.26	27	From Big River ~5 miles downgradient of the site and ~2.75 miles downstream of Flat River confluence
217	650	7.58	23	From Turkey Creek ~1,500 ft upgradient of the Big River confluence

Table 6-3 (Continued)
Surface Water Sample Summary
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample #	Cond (µmhos)	pH	Temp (°C)	Location
218	205	7.34	27	From Terre Bleue Creek ~750 ft upgradient of the Big River confluence
219	315	7.46	25	From Big River ~10 miles downstream of the site and ~2.5 miles downstream of Hwy. K bridge
220	310	7.4	26	From Big River ~15 miles downstream of the site and ~0.5 mile upstream of the Hwy. E bridge

Note: All samples are requested to be analyzed for total and dissolved metals. A corresponding 100-series sediment sample was collected at every surface water sample location (Table 6-2). All samples were collected on the waterway or from public access points. See Plates 2 and 3 for sample locations.

Creek, which are major Big River tributaries. For Hazard Ranking System (HRS) scoring purposes, the farthest downstream location was 15 miles from the site.

The sediment and surface water samples were either collected at public access points on the stream or from a johnboat.

The sediment samples were composite samples consisting of three aliquots, one collected every 5 feet over a 15-foot linear distance. Samples were collected using either an Eckman Dredge, a shovel, or a stainless steel spoon. Table 6-2 indicates if a tool other than the Eckman Dredge was used. A shovel was used when gravel on the river bottom prevented dredge use. A stainless steel spoon was used for some tributary samples.

After collection of surface water samples, specific conductivity, pH, and temperature were recorded in the field. The surface water samples were also preserved in the field to a pH <2 with 1:1 nitric acid, and then were placed in a cooler and iced to 4°C.

6.3 GROUND WATER SAMPLING

Ground water samples were collected from monitoring wells, springs, Geoprobe temporary wells, artesian wells, and private wells on site and in the vicinity. Twenty-one ground water samples were collected. Six quality assurance samples were also collected. Table 6-4 summarizes the ground water samples collected, and locations are depicted on Plates 2 and 3. Five springs, including one background spring, were sampled around the site perimeter. The background spring was located across the river from the site. Four samples were collected from Geoprobe temporary wells that were installed along the north perimeter of the meander area.

Two artesian wells located just west of the site near Owl Creek were sampled. According to AuBuchon, the artesian wells are former exploratory borings installed many years ago by St. Joe Minerals. Apparently the borings were never properly plugged after installation. Several of these pipes are present in the vicinity.

Two drinking water wells were sampled. A sample was collected from the on-site well located at the landfill office. A sample was collected from a private well at a residence located approximately 750 feet south

Table 6-4
Ground Water Sample Summary
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample #	Well Depth	Cond (μmhos)	pH	Temp (°C)	Location
300	---	600	7.38	22	From spring on W boundary of site at W bend in river ~600 ft downstream of W Desloge River access
301	un-known	550	7.16	17	From artesian well ~25 ft E of W bank of Owl Creek and ~50 ft N of abandoned RR spur
302	---	600	7.25	28	From spring on NE boundary of site ~0.75 mile upstream of major collapse area
303	---	1,100	7.07	28	From spring on E boundary of site at major collapse area
304	---	600	7.57	25	From spring on E arm boundary of site ~0.75 mile downstream of major collapse area
305	---	2,100	10.62	21	From tributary to Big River carrying effluent from RESCO products, taken ~500 ft downstream of N Desloge River access
306	---	1,400	7.39	25	From leachate seep area at S central boundary of site near well DG-3
307	216	550	6.92	17	From landfill office well, SWL ~63 ft
308	200-300	680	6.97	18	From private well at Kennedy residence ~750 S of SW edge of site
309	10.75	1,400	6.56	18	From on-site MW DG-5 at E bend in river, SWL was 4.25 ft
309D	10.75	1,400	6.56	18	Duplicate of sample #309
310	37.5	900	6.78	15	From on-site MW UG-1 N of landfill in S central river meander area, SWL was 26 ft
311	45.75	1,100	6.56	17	From on-site MW DG-3 at S border of site, SWL was 44.5 ft
312	30.5	700	6.45	16	From on-site MW DG-2, E of landfill SWL was 25.5
314	9	470	7.15	25	From on-site Geoprobe-TW on W side of meander area near pond, SWL was 7 ft
315	12	420	7.05	25	From on-site Geoprobe-TW on NW side of meander area, SWL was 9 ft
316	12	600	6.93	20	From on-site Geoprobe-TW on N side of meander area, SWL was 9 ft
317	12	700	7.11	20	From on-site Geoprobe-TW on NE side of meander area, SWL was 9 ft
318	---	550	7.04	17	From background spring on opposite river bank from site at the W bend in river
319	---	650	7.54	19	From NW end of drainage tunnel ~300 ft SE of W Desloge River access
320F	---	---	---	---	Trip Blank (total metals only)
321F	---	---	---	---	Field Blank
322F	---	---	---	---	Field Blank
323F	---	---	---	---	Rinsate of disposable Teflon bailers
324	un-known	700	7.10	15	From artesian well ~20 ft E of Owl Creek and 100 ft S of Owl Creek and Big River confluence
324F	---	---	---	---	Rinsate of Geoprobe pipe
325F	---	---	---	---	Acid Blank (total metals only)

MW = monitoring well;
TW = temporary well;
SWL = Static Water Level (measured from top of protective steel casing of MW).

Note: All samples are requested to be analyzed for total and dissolved metals except for samples 320F and 325F, which were submitted for total metals only. All samples were collected on site or from the river waterway, except for sample 308 which was taken from the Kennedy residence. Sample 313 was not used. Sample 305 was believed to be a small spring when sampled, but it was later discovered to be a small tributary. See Plates 2 and 3 for sample locations.

of the site.

While on site, it was discovered that a drainage tunnel exists beneath the site. The tunnel extends from an opening located approximately 300 feet southeast of the landfill office and trends southeast/northwest to an exit opening near the west Desloge River access. The tunnel is approximately 1,500 feet long. The E & E/FIT learned from AuBuchon that the tunnel was built by St. Joe Minerals and was used to divert surface water drainage from a tributary to Big River. The E & E/FIT sampled a leachate seep that drains into the southeast entrance of the tunnel and also collected a sample from where water exits at the northwest end of the tunnel before it enters Big River.

Ground water sample 305 initially appeared to be a spring when it was sampled; however, it was determined later to be a small tributary to Big River. The tributary drains part of the RESCO Products property. The water appeared very turbid and white in color and had a pH of 10.62. This tributary is apparently being influenced by operations at the RESCO Products property. It is known that a large quarry exists on the RESCO property.

Five ground water samples, including one duplicate, were collected from four of the six monitoring wells. Two of the monitoring wells were dry. The following table lists information regarding the monitoring well sampling.

Monitoring Well Information

Well #	Total Depth	Depth to Static Water Level (ft)	Water Height (ft)	Volume Purged (gal)	Sample #
UG-1	37.5	26	11.5	3.5	310
DG-1	Dry	--	--	--	--
DG-2	30.5	25.5	5	1.5	312
DG-3	47.75	44.5	1.25	0.3	311
DG-4	Dry	--	--	--	--
DG-5	10.75	4.25	6.5	4.5	309, 309D

The monitoring wells were purged using disposable polyethylene bailers. The wells were purged of three volumes or until dry. After purging, the wells were allowed to recharge for approximately 24 hours before sampling. The bailers were rinsed with deionized water before sampling.

Immediately after collection of ground water samples, specific conductivity, pH, and temperature were recorded (Table 6-4). The ground water samples were preserved to a pH <2 with 1:1 nitric acid, and then were placed in a cooler and iced to 4°C.

Six QA/QC samples were submitted: two field blanks, a trip blank, an acid blank, a rinsate sample of a bailer, and a rinsate sample of Geoprobe pipe.

6.4 AIR SAMPLING

The E & E/FIT performed a general reconnaissance of the site and surrounding area on July 21, 1990, and determined placement of the Hi-vol air samplers. Six locations were chosen. On July 22, 1990, seven Hi-vol samplers were set up (Plate 1). One location had co-located Hi-vols in order to collect a replicate sample. Six of the Hi-vols were powered by 3,500 watt, gasoline-powered generators, and one Hi-vol, located just north of the landfill office, was plugged into an electrical outlet. Two Hi-vols were placed on site, and five were placed off site. One Hi-vol was set up on the north end of the site, and one was set up at the landfill office area where daily traffic can be heavy. Three Hi-vols, in two locations, were set up to the east in a downwind direction. The predominant wind direction transporting tailings in the area was determined to be from the west to the east with some southwest and northwest influence. One Hi-vol was set up to the west in between the Leadwood tailings pile and the site. One remote background Hi-vol was set up to the west of the site and to the northwest of the Leadwood tailings pile. The locations of the Hi-vols are as follows:

- Hi-vol 1 and 2 - Across Big River approximately 1,500 feet east of the site.
- Hi-vol 3 - On site in the northeast section of the river meander area.

- Hi-vol 4 - On site in southwest section approximately 150 feet north of landfill office.
- Hi-vol 5 - Approximately 1.25 miles east of the site, near Hwy. 67 and Big River intersection.
- Hi-vol 6 - Approximately 1 mile west-southwest of the site, between Leadwood pile and the site.
- Hi-vol 7 - Approximately 4 miles west of the site.

All Hi-vol locations are illustrated on Plates 1 and 3. The Hi-vol samplers were placed on stands, making them 6 feet above the ground surface in order to characterize the air quality in the breathing zone.

A Campbell Scientific Portable Meteorological Station was placed on site in the south section of the meander area (Plates 1 and 3). The station continuously collected wind speed, wind direction, temperature, relative humidity, and barometric pressure.

The Hi-vol samplers were operated for approximately 12 hours each day for six consecutive days. The samplers were run for the 12-hour period of noon to midnight to accommodate diurnal changes.

Forty-seven air samples, including a field blank for each day, were collected from six locations over a six-day sampling period (Table 6-5). Sampling began on July 23, 1990, and ended on July 28, 1990. A sample was not collected from Hi-vol 5 on July 23, 1990, because the Hi-vol was not functioning properly. Sample 406 was submitted for analysis; however, it cannot be used as comparable data because the sampler ran for 24 hours due to a timer malfunction. All air samples were submitted for total metals analyses.

Table 6-5

Air Sample Summary

Big River Mine Tailings

Desloge, Missouri

E & E/FIT; July 1990

Sample Series CSXCR

Sample #	Location	Date Collected	Property Owner
400	Hi-vol #1	7-23-90	Wood
402	Hi-vol #2	7-23-90	Wood
403	Hi-vol #3	7-23-90	County
404	Hi-vol #4	7-23-90	County
*405	Hi-vol #5 (not submitted)	7-23-90	-----
*406	Hi-vol #6	7-23-90	Pratte
407	Hi-vol #7	7-23-90	Glore
408	Field Blank	7-23-90	-----
409	Hi-vol #1	7-24-90	Wood
410	Hi-vol #2	7-24-90	Wood
411	Hi-vol #3	7-24-90	County
412	Hi-vol #4	7-24-90	County
413	Hi-vol #5	7-24-90	Callahan
414	Hi-vol #6	7-24-90	Pratte
415	Hi-vol #7	7-24-90	Glore
416	Field Blank	7-24-90	-----
417	Hi-vol #1	7-25-90	Wood
418	Hi-vol #2	7-25-90	Wood
419	Hi-vol #3	7-25-90	County
420	Hi-vol #4	7-25-90	County
421	Hi-vol #5	7-25-90	Callahan
422	Hi-vol #6	7-25-90	Pratte
423	Hi-vol #7	7-25-90	Glore
424	Field Blank	7-25-90	-----
425	Hi-vol #1	7-26-90	Wood
426	Hi-vol #2	7-26-90	Wood
427	Hi-vol #3	7-26-90	County
428	Hi-vol #4	7-26-90	County
429	Hi-vol #5	7-26-90	Callahan
430	Hi-vol #6	7-26-90	Pratte
431	Hi-vol #7	7-26-90	Glore
432	Field Blank	7-26-90	-----
433	Hi-vol #1	7-27-90	Wood
434	Hi-vol #2	7-27-90	Wood
435	Hi-vol #3	7-27-90	County
436	Hi-vol #4	7-27-90	County
437	Hi-vol #5	7-27-90	Callahan
438	Hi-vol #6	7-27-90	Pratte
439	Hi-vol #7	7-27-90	Glore
440	Field Blank	7-27-90	-----
441	Hi-vol #1	7-28-90	Wood
442	Hi-vol #2	7-28-90	Wood
443	Hi-vol #3	7-28-90	County
444	Hi-vol #4	7-28-90	County
445	Hi-vol #5	7-28-90	Callahan
446	Hi-vol #6	7-28-90	Pratte
448	Hi-vol #7	7-28-90	Glore
449	Field Blank	7-28-90	-----

* Because of Hi-vol malfunctions, these samples will not be used.

Note: All samples were requested to be analyzed for total metals. The high volume samplers were run for a 12-hour sample period from 1200 hours to 2400 hours for each sample. Sample numbers 401 and 447 were not used. See Plates 1 and 3 for sample locations.

SECTION 7: ANALYTICAL RESULTS

In general, the analytical data results from the Big River Mine Tailings site were acceptable. However, some data were coded.

<u>Data Qualification Code</u>

U = The material was analyzed for but was less than the measurement detection limit. The associated number is the detection limit.

J = The data are reported but are not valid by approved QC procedures. The numerical value is an estimated quantity.

I = The sample data are invalid. No value is reported.

The complete explanation for coded data is included in Appendix D with the data transmittal.

7.1 SOIL AND TAILINGS

The metals of primary concern in the soil and tailing samples are arsenic, cadmium, cobalt, lead, nickel, and zinc. The presence and concentrations of these metals will be discussed in this section; the analytical results are summarized in Table 7-1. The complete data transmittal is included in Appendixes D and E.

Because the site is located in the Old Lead Belt, it is difficult to establish background concentrations for natural soils. It is known that in this area, tailings have been used for agricultural lime on fields, mixed in asphalt for paving roads, spread on gravel roads, and used for fill material. These practices all are mechanisms for the dispersal of contaminants. Aeolian influences also spread contamination as metals-laden dust and tailings are deposited on downgradient soils via wind erosion. Howard Wood, property owner of the farm adjacent to the east side of the site, stated during the LSI that he has never had to lime his fields because of the tailings material that has been deposited on his property via wind erosion. Another reason that background concentrations may be difficult to establish is that the Bonneterre Formation underlying the site contains heavy metal

Table 7-1
Selected Metals in Soil and Tailings Samples
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample (mg/kg)	Arsenic	Cadmium	Cobalt	Lead	Nickel	Zinc
001	6.3	1.2U	14	130 J	9.4U	65
*002	14	21	13	1000 J	18 J	950
*003	7.7	14	11	1100 J	15 J	570
*004	8.1	20	11U	1400 J	8.5 U	840
*005	8.6	8.4	14	930 J	15 J	370
*006	9.6	19	27	1500 J	20 J	870
*007	9.4	28	15	1700 J	12 J	1200
*008	2.1U	30	13	1600 J	14 J	1300
*009	9.7	13	12	1300 J	16 J	610
*010	14	79	42	13000 J	37 J	4300
*011	6.5	24	10 U	970 J	9.0 J	1200
b-012	9.3	1.3 U	16	65 J	10 U	35
013	6.9	1.2 U	15	450 J	9.6 U	42
014	6.2	1.3 U	16	85 J	17 J	57
015	8.2	3.2	16	370 J	11 J	180
016	13	6.0	13 U	940 J	10 U	490
b-017	9.5	1.2 U	14	64 J	9.5 U	66
b-018	7.2	4.8	16	1500 J	12 J	370
b-019	6.8	5.3	18	1600 J	12 J	390
b-020	6.2	1.2 U	12 U	76 J	9.4 U	67
*021	2.3 U	16	19	1500	20	760 J
022	2.2 U	270	16	650	8.8 U	13000 J
023	2.1 U	2.1	12	190	15	140 J
024	2.3 U	1.2 U	12 U	99	9.2 U	98 J
025	3.1 U	1.6	18	130	12 U	53 J
026	2.3 U	25	13	1300	9.6	1100 J
*027	2.4 U	11	38	2500	36	630 J
*028	2.1 U	10	10 U	1600	9.5	510 J
*029	7.0 J	11	11 U	910	9.1 U	510 J
030	7.6 J	7.9	23	2200	21	430 J

b = Background Sample
* = Tailings Sample
J = Data reported but not valid by approved QA/QC procedures
U = Less than measurement detection limit, the associated number is the detection limit.

Note: See Table 1 and Plates 1 and 3 for sample locations and the data transmittal in Appendix D for complete analytical results.

mineralization (lead ore) outcrops. Some surface soils in the area were formed from weathered Bonneterre and may naturally contain elevated concentration of metals. These factors were all taken into account when off-site sampling was conducted. An attempt was made to sample only soil that visually appeared to be indigenous and not influenced by road construction, fill activities, or other artificial interferences.

Five background samples, including a duplicate, were collected from several miles west of the site in areas where influence from wind erosion and deposition from the site or the Leadwood tailings pile would be minimal. Three of these samples (012, 017, and 020) were collected from pastureland, and two samples (018 and 019), including the duplicate, were collected from a residence in the Terre Du Lac subdivision. The three samples collected from pastureland had mean concentrations of 8.3 mg/kg arsenic, 10 mg/kg cobalt, 68.3J mg/kg lead, and 56 mg/kg zinc. Nickel and cadmium were undetected. (Note: A J code will only be associated with the mean value if a significant amount (>25%) of the data used to calculate the mean are J-coded.) However, the samples collected at the Terre Du Lac residence (018 and 109) had elevated concentrations of most metals with means of 7.0 mg/kg arsenic, 5.05 mg/kg cadmium, 17 mg/kg cobalt, 1,550 J mg/kg lead, 12 J mg/kg nickel, and 380 mg/kg zinc. Because the location where samples 018 and 019 were collected is not undisturbed soil, they are not comparable to the pastureland samples; therefore, the samples will not be considered representative of background conditions.

Fourteen tailings samples, including a duplicate, were collected from ten locations on site to characterize the level of metals concentrations in the surface (0-6") of the pile. However, three subsurface tailings samples (027, 028, and 029) were collected at one location (surface sample 009 location) in order to characterize the subsurface. The ranges and mean concentrations of metals in the tailings samples on site are arsenic ranging from undetected to 14 mg/kg; 7.6 mg/kg mean; cadmium ranging 8.4 to 79 mg/kg, 21.7 mg/kg mean; cobalt ranging undetected to 42 mg/kg, 15.4 mg/kg mean; lead ranging 910 to 13,000 J mg/kg, 2,215 J mg/kg mean; nickel ranging undetected to 37 J mg/kg, 15.8 J mg/kg mean; zinc ranging 370 to 4,300 mg/kg, 1,044 J mg/kg mean. It should be noted that sample 010 collected from the east area of the site, contained the highest concentrations of metals and significantly raised the mean concentrations. In a study performed by UMR, in which 74 surface tailings samples were collected over the entire tailings site, the mean lead concentration was 2,077 mg/kg, the mean cadmium concentration was 26 mg/kg, and the mean zinc concentration was 1,226 mg/kg (Wixon 1983). Therefore, the mean values established from the LSI sampling are similar to the UMR study. When comparing the background concentrations of cadmium, lead, nickel, and zinc in soil to the tailings, it is obvious that the tailings contain extremely elevated concentrations of these metals. The arsenic and cobalt concentrations do not appear to be significantly elevated in the tailings when compared to background concentrations. Arsenic and cobalt concentrations are discussed herein because ground water samples collected on site exhibited elevated levels of these metals.

The four subsurface tailings samples (009, 027, 028 and 029) were collected at 0 to 6 inches, 5 to 6 feet, 10 to 11 feet, and 15 to 16 feet, respectively. Concentrations of cobalt, lead, and nickel increased significantly from the 0 to 6 inches to the 5- to 6-foot interval. The following concentrations were reported:

Sample #	Depth (feet)	Cobalt (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)
009	0-.5	12	1,300 J	16 J
027	5-6	38	2,500	36
028	10-11	10 U	1,600	9.5
029	15-16	11 U	910	9 U

At the 10- to 11- and 15- to 16-foot intervals, metal concentrations appear to return to values similar to or less than the concentrations reported in surface sample depths. This could indicate that these metals have migrated down from the upper five feet, resulting in even higher concentrations at this depth. However, much more sampling and characterization of the subsurface is needed to draw any definitive conclusions. Arsenic and zinc concentrations did not vary significantly with depth.

Soil or tailings samples were collected at each Hi-vol air sampler location in order to establish metals concentrations at those locations and to verify a zone of influence in which the deposition of tailings via wind erosion occurs. Additional samples were also collected from each direction surrounding the site to aid in the determination of this zone of influence.

Hi-vol sampler location 3 (sample 006) and Hi-vol sampler 4 (sample 011), both located on the tailings have been considered in the tailings results discussion. Also, Hi-vol sampler location 7 (sample 012) has been discussed as a background.

Based on the limited sampling conducted, the most significant area of influence from the site appears to be toward the east and southeast. The nearest resident is approximately 100 feet south of the site on the southwest edge where sample 022 was collected. Results from sample 022 indicated 270 mg/kg cadmium, 16 mg/kg cobalt, 650 mg/kg lead, and 13,000 J mg/kg zinc. These are the highest cadmium and zinc concentrations of any soil or tailings sample collected. Arsenic and nickel were reported as undetected. Results from a sample (026) collected from a day care center playground located approximately 1,500 feet south of the site detected cadmium at 25 mg/kg, cobalt at 13 mg/kg, lead at 1,300 mg/kg, nickel at 9.6 mg/kg, and zinc at 1,100J mg/kg. Arsenic was undetected. Sample 030 was collected approximately 1,000 feet south of the site at a private residence and results indicate 7.6 J mg/kg arsenic, 7.9 mg/kg cadmium, 23 mg/kg cobalt, 2,200 mg/kg lead, 21 mg/kg nickel, and 430 J mg/kg zinc. The two residential samples and the day care center sample have very high concentrations of lead, cadmium, and zinc that are comparable to concentrations found in tailings samples. Therefore, it can be concluded that this area south of the site has been and is currently being influenced by the site.

Sample 015 was collected approximately 1,500 feet east of the site at the co-located Hi-vol sampler locations 1 and 2. Results from sample 015 found arsenic at 8.2 mg/kg, cadmium at 3.2 mg/kg, cobalt at 16 mg/kg, lead at 370 J mg/kg, nickel at 11 J mg/kg, and zinc at 180 mg/kg. The elevated levels of lead, cadmium, and zinc at this location also indicate that this area east of the site is being influenced by the site. Sample 014 was collected at Hi-vol sampler location 5, approximately 1.25 miles east of the site, and sample 023 was collected approximately two miles east of the site to determine if the soils in these areas have been influenced by the site. Lead concentrations in samples 014 and 023 were 85 J mg/kg and 190 mg/kg, respectively. These lead concentrations are relatively low in comparison to the tailings samples. Other metals of concern were also found at relatively low concentrations. Results of samples 014 and 023 indicate that the soils are not significantly influenced at these locations.

Soil samples 001, 025, and 024 were collected approximately 750 feet southwest of the site, approximately 2,000 feet west of the site and approximately 0.75 miles north of the site, respectively. The concentrations of metals of concern in these three samples are not significantly above background. Therefore, it appears that the soils on the west and north sides have not been influenced at the sampling locations. Perhaps if more soil sampling was performed within a few hundred feet of the site, an area of influence could be established; however, much more sampling would be required to accurately define the entire zone of influence.

Two samples (016 and 013) were collected at locations between the Leadwood tailings pile and the site. These samples were reported to contain lead at 450 J mg/kg in 013, and at 940 J mg/kg in 016. Other metals of concern were also significantly elevated. This could be the result of natural conditions or tailings deposition via wind erosion from the Leadwood pile. However, it is most likely attributable to transport of tailings to that location for fill or construction purposes. Sample 016 was collected at a cemetery where tailings may have been used for fill. Sample 013 was taken in a pasture adjacent to a newly constructed residence where tailings were used as base for part of the drive.

A total of 30 soil or tailing samples were collected to establish background concentrations, determine concentrations present in the on-site tailings, and characterize an area or zone of influence where tailings have migrated off site via wind erosion and elevated the concentrations of metals in the soils. Establishing natural background concentrations in this area of regional mining activity and widespread varied usage of tailings is difficult. However, three samples from apparently undisturbed soil in pastures west of the mining area contained consistently low levels of lead and other heavy metals. The 14 tailing samples collected on site confirmed the presence of elevated levels of lead (up to 13,000 J mg/kg). Samples of soil collected from around the site indicate that the soils to the south and east at distances of at least 1,500 feet from the site are being influenced most significantly. Off-site areas exhibiting elevated levels of metals include lawns of private residences and a playground of a day care center.

7.2 SEDIMENT AND SURFACE WATER

It should be emphasized that the heavy metals contamination associated with the area near the site is a regional problem. Consequently, a limited regional sampling plan of surface water and sediment was implemented in order to assess the relative impact of the Big River Mine Tailings site on the Big River. The sampling plan was designed to establish attribution of heavy metals contamination from the major tributaries that drain tailing-contaminated basins into Big River. To achieve this objective, background sampling began approximately 16.5 miles upstream of the site location and continued to approximately 15 miles downstream of the site. The discussion of the sample results will begin at the furthest upstream location and consider the impact of the regional mining wastes as the Big River progresses downstream.

Sediment and surface water samples were collected concurrently at the same location; therefore, data results of both media will be discussed together. Metals of concern in the sediment include arsenic, cadmium, cobalt, lead, nickel, and zinc. Cadmium, lead, and zinc are the primary and most widespread contaminants in the sediment while arsenic, cobalt, and nickel were found generally at much lower concentrations but occur at elevated concentrations sporadically. These metals will only be discussed when elevated levels are found. Lead and zinc were the only metals of concern found at elevated levels in the surface water. Tables 7-2 and 7-3 list the selected heavy metal results found in the sediment and surface water, respectively. Sediment samples have 100-series numbers, and surface water samples are assigned the corresponding 200-series number. A total of 21 locations, including a duplicate, were sampled for sediment and surface water.

Two background sample locations (100, 200 and 101, 201) upgradient of any mining wastes were collected from Big River. Refer to Plates 2

Table 7-2
Selected Metals in Sediment Samples
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample (mg/kg)	Arsenic	Cadmium	Cobalt	Lead	Nickel	Zinc
*100	4.4 J	1.1 U	11 U	1.1 U	9.0 U	21 J
*101	5.5 J	1.1 U	11 U	1.4	9.1 U	53 J
102	2.5 U	140	12 U	10,000	9.8 U	6,500 J
103	30 J	46	13 U	720	10 U	1,900 J
104	2.2 U	130	11 U	5,500	8.9 U	6,600 J
105	6.2 J	21	11 U	1,700	10	840 J
106	8.3 J	42	12 U	1,600	9.3 U	2,200 J
107	9.0 J	88	12 U	3,600	12	4,500 J
108	2.2 U	59	11 U	1,300	9.6	2,600 J
109	6.4 J	24	12 U	1,300	13	1,100 J
110	5.5	32	52	540	59	1,900
111	6.7	6.3	10 U	350	13	400
112	11	63	13 U	3,100	12	3,300
112D	6.4	120	12 U	3,400	9.8 U	6,700
113	18	16	12 U	2,500	12	810
114	7.9	28	12 U	3,800	11	1,800
115	21	18	16	3,500	18	970
116	7.1	14	12	1,200	13	1,000
117	11	37	44	8,700	58	1,500
*118	2.2 U	1.0 U	10 U	4.4	5.8	7.7U
119	5.5 J	6.1	11 U	610	13	370
120	4.5 U	3.7 U	1.1 U	680	8.6 U	290

* Background Sample
J - Data reported but not valid by approved QC procedures
U - Less than measurement detection limit, the associated number is the detection limit.

Note: See Plates 2 and 3 for sample locations and the data transmittal in Appendix D for complete analytical results. A corresponding 200-series surface water sample was collected at every sediment location (Table 7-3).

Table 7-3
Selected Metals in Surface Water Samples
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample	Lead		Zinc	
(µg/l)	Total	Dissolved	Total	Dissolved
* 200	3.0 U	3.0 U	20 U	20 U
* 201	3.0 U	3.0 U	74	20 U
202	61	23	1,300	1,200
203	15	3.0 U	44	20 U
204	37	3.3 U	81	44
205	29	3.0 U	74	41
206	32	3.0 U	84	56
207	34	3.9 U	100	68
208	33	4.0	98	68
209	31	4.5	98	86
210	6.0	3.0 U	42	20 U
211	26	3.0 U	62	34 U
212	29	4.4	120	100
212 D	28	4.8	130 U	99
213	30	5.4	130	110
214	27	5.7	150	130
215	32	16	120	130
216	49	9.5	130	100
217	22	11	34 U	31 U
* 218	3.0 U	3.0 U	20 U	20 U
219	26 J	8.2 J	91	62
220	49 J	11 J	70	39

* Background Samples
J - Data reported but not valid by approved QA/QC procedures
U - Less than measurement detection limit, the associated number is the detection limit.

NOTE: See Plates 2 and 3 for sample locations and the data transmittal in Appendix D for complete analytical results. A corresponding 100-series sediment sample was collected at every surface water sample location (Table 7-2).

and 3 for sample locations. Samples 100 and 200 were collected approximately 16.5 miles upstream of the site near Irondale, Missouri. Sediment sample 100 contained arsenic at 4.4 J mg/kg and zinc at 21 J mg/kg; cadmium, cobalt, lead, and nickel were undetected. No metals of concern were detected in surface water sample 200. Samples 101 and 201 were collected approximately 9.7 miles upstream of the site. Sample 101 contained arsenic at 5.5 J mg/kg, lead at 1.4 mg/kg and zinc at 53 J mg/kg with cadmium, cobalt, and nickel reported below detection limits. Only total zinc at 74 µg/l was found in surface water sample 201. These samples indicate the very low metals concentrations found in the Big River upgradient of the mining district.

The tributary that drains the Leadwood Tailings pile to Big River is the farthest major tributary upstream that contributes a significant amount of metals contamination to Big River (Plate 2). Samples 102 and 202 were collected from this tributary approximately 800 feet upgradient of its Big River confluence. Sediment sample 102 contained high concentrations of cadmium at 140 mg/kg, lead at 10,000 mg/kg, and zinc at 6,500 J mg/kg. Surface water sample 202 contained 61 µg/l total and 23 µg/l dissolved lead, as well as 1,300 µg/l total and 1,200 µg/l dissolved zinc. The next downstream location sampled on Big River (103,203) was located approximately halfway between the Leadwood tributary confluence and the Owl Creek confluence with Big River. Sediment results of sample 103 detected 30 J mg/kg arsenic, 46 mg/kg cadmium, 720 mg/kg lead, and 1,900 J mg/kg zinc. Surface water sample 203 contained 15 µg/l total lead and 44 µg/l total zinc with no detects in the dissolved metals analysis. The elevated metals in the sediment and the elevated total lead in the surface water at this location on Big River is directly attributable to the Leadwood tributary.

Owl Creek is the next tributary along the river that contributes some heavy metal contamination. Its confluence with Big River is approximately 500 feet upgradient of the Big River tunnel discharge confluence (See Plate 3). Owl Creek does not directly drain a tailings pile; however, it does contain tailings in its sediment. The source of these tailings appears to be an abandoned railroad spur which crosses Owl Creek just southwest of the site (See Plate 3). The railroad bed is constructed primarily of tailings, some of which have apparently eroded and entered Owl Creek. Two locations were sampled along Owl Creek. Samples 110 and 210 were collected just north (downgradient) of the abandoned railroad spur. Sediment sample 110 contained arsenic at 5.5 mg/kg, cadmium at 32 mg/kg, cobalt at 52 mg/kg, lead at 540 mg/kg, nickel at 59 mg/kg, and zinc at 1,900 mg/kg. Surface water sample 210 contained 6.0 µg/l total lead and 42 µg/l total zinc. Samples 111 and 211 were collected on Owl Creek approximately 30 feet upgradient of the Big River confluence. Concentrations of metals in sediment sample 111 were much less than sample 110 with arsenic at 6.7 mg/kg, cadmium at 6.3 mg/kg, cobalt undetected, lead at 350 mg/kg, nickel at 13 mg/kg, and zinc at 400 mg/kg. Surface water sample 211 detected total lead at 26 µg/l and total zinc at 62 µg/l. The metals concentrations in sediment sample 110 are probably higher because it was taken adjacent to the railroad spur where tailings directly enter Owl Creek. The metals concentrations in the Owl Creek water are probably higher near the confluence of Big River due to the significant amount of ground water entering Owl Creek directly from the numerous artesian wells along its east bank. Water from these wells contains elevated concentrations of metals. Results of the artesian well samples are discussed in Section 7.3 and are listed in Table 7-4. Although Owl Creek does contribute heavy metals to Big River, a comparison of its sediment and surface water metal content suggests it is only a minor contributor.

The previously discussed tunnel that runs under the site and discharges near the West Desloge River Access is the next contributor of tailings, surface water, ground water, and landfill leachate to the Big River. The water, leachate, and sediment (tailings) at the entrance and at the exit opening were sampled and found to contain elevated levels of metals. Sample 021 was collected from the entrance of the tunnel and is discussed in Section 6.1. No sediment was available at the tunnel exit; therefore, no sample was collected. Leachate samples 306 and 319 collected at the entrance and exit openings of the tunnel, respectively, are discussed in Section 7.3.

In an interview with landfill manager Bryant Aubuchon, the E & E/FIT learned that this tunnel transports a significant amount of tailing and surface water into Big River during major storm events. Also landfill leachate constantly flows into the tunnel. It is also assumed that some ground water is discharged through the tunnel. A thorough reconnaissance of this tunnel is needed to determine if any other significant seeps are present or whether any other tunnels drain into it. This tunnel is potentially one of the major sources of contaminants entering the river.

Samples 104 and 204 were collected on Big River approximately 400 feet downstream of the tunnel discharge confluence. These samples were also collected upgradient of any areas around the site where tailings are directly in contact with the river or are entering it via water erosion. Results of sediment sample 104 detected a significant increase of metals with 130 mg/kg cadmium, 5,500 mg/kg lead, and 6,600 J mg/kg zinc. Surface water sample 204 contained 37 µg/l total lead, undetected dis-solved lead, 81 µg/l total zinc, and 44 µg/l dissolved zinc. This sig-nificant increase in heavy metals in the Big River sediment and surface water directly downgradient of the tunnel discharge strongly suggests the tunnel as the source. Additionally, the extremely high concentrations of dissolved zinc found in the leachate seep at the tunnel entrance and in the water at the tunnel exit may be attributable to the first elevated dissolved zinc concentrations in Big River in sample 204.

A total of eight samples, including a duplicate, were sampled at seven locations on the river and around the tailings pile. It should be noted that during the sampling of the Big River numerous areas where tailings are in contact with the river and are easily transported into the river via water erosion were observed. The major areas that were observed are illustrated on Plate 3. Also, numerous ground water seeps or springs originating from the tailings were observed draining directly into Big River. Four of these seeps were sampled and found to contain elevated metals. The seep sample results are discussed in Section 7.3. The range and mean values of the metals of concern in the eight sediment samples (104, 105, 106, 107, 108, 109, 112, and 112D) collected on the Big River adjacent to the site are: arsenic, undetected to 11 mg/kg, 5.9 J mg/kg mean; cadmium, 21 mg/kg to 130 mg/kg, 68.4 mg/kg mean; lead, 1,300 mg/kg to 5,500 mg/kg, 2,687 mg/kg mean; nickel, undetected to 13 mg/kg, 7.1 mg/kg mean; zinc, 840 J mg/kg to 6,700 mg/kg, 3,480 J mg/kg mean. After comparing upstream sediment samples with the extremely elevated concentrations in these samples, it is obvious that the Big River Mine Tailings site is affecting the benthic zone of the river by significantly increasing the heavy metals content and physically altering it with the introduction of thousands of cubic yards of tailings. Surface water samples at these seven locations were also elevated. The following is the range and mean for the eight surface water samples: total lead 28 μg/l to 37 μg/l, 31.6 μg/l mean; total zinc 74 μg/l to 120 μg/l, 81.9 μg/l mean; and dissolved zinc 41 μg/l to 100 μg/l, 70.2 μg/l mean. Dissolved lead was undetected in these samples until sample 208. Samples 208, 209, 212, and 212D had dissolved lead ranging from 4.0 to 4.8 μg/l and a mean concentration of 4.4. μg/l.

A clear pattern of increasing concentrations of lead and zinc in the surface water is evident at each of these locations in a downstream progression. The impact of the site on the surface water is particularly evident in the dissolved lead fraction, which increases from undetected to 4.8 μg/l and in dissolved zinc which increases from 44 μg/l to 100 μg/l progressively downstream along the border of the site.

Samples were collected at approximately 0.75 miles (113, 213) and at approximately 1.5 miles (114, 214) downstream of the eastern edge of the site. The bottom of the river was observed to be lined with tailings along this section. Results of the metals in sediment samples 113 and 114 were very similar to the sediments around the site. Surface water samples 213 and 214 were found to contain increasing dissolved lead at 5.4 μg/l and 5.7 μg/l, respectively, as well as increases in dissolved zinc at 110 μg/l in samples 213 and 130 μg/l in sample 214.

The Flat River is the next major tributary downstream that drains tailings piles into Big River. The confluence of Flat River and Big River is approximately 2.75 miles downstream of the east edge of the site. Flat River drains the Federal tailings pile (the largest one in the Old Lead Belt) as well as the Elvins and National tailings piles (See Plate 2). Samples 115 and 215 were taken from Flat River approximately 300 feet upgradient of this confluence. Sediment sample 115 contained 21 mg/kg arsenic, 18 mg/kg cadmium, 16 mg/kg cobalt, 3,500 mg/kg lead, 18 mg/kg nickel, and 970 mg/kg zinc. Surface water sample 215 detected total lead at 32 μg/l, dissolved lead at 16 μg/l, total zinc at 120 μg/l, and dissolved zinc at 130 μg/l. These sample results verify that Flat River is another major contributor of heavy metal contamination to Big River.

Samples 116 and 216 were collected on Big River approximately 5 miles downstream of the site and approximately 2.5 miles downstream of the Flat River confluence. Sediment sample 116 contained arsenic at 7.1 mg/kg, cadmium at 14 mg/kg, cobalt at 12 mg/kg, lead at 1,200 mg/kg, nickel at 13 mg/kg, and zinc at 1,000 mg/kg. Surface water sample 216 contained 49 μg/l total lead, 9.5 μg/l dissolved lead, 130 μg/l total zinc, and 100 μg/l dissolved zinc. It is evident that though the heavy metals in the sediment are still elevated at this location the concentrations have decreased substantially. This phenomenon is probably due to the river's ability to transport large quantity of tailings from the site. Most sediments are transported during high flow (high velocity) events. Therefore, as the flow and velocity decreases in the river, the majority of the sediments fall out of suspension and are deposited in the river bottom. Consequently, the highest concentrations of heavy metals (as well as the heaviest tailings deposition) are found within two to three miles downstream of the Big River Mine Tailings site. A statistical sampling is needed to verify this assumption. The surface water at the sample 216 location has apparently been elevated by the addition of the Flat River contaminants. Total lead increased from 27 μg/l in 214 to 49 μg/l in 216; dissolved lead increased from 5.7 μg/l in 214 to 9.5 μg/l in 216.

Samples 118 and 218 were collected from Terre Bleue Creek, approximately 750 feet upgradient of the Big River confluence. The confluence of Terre Bleue Creek and Big River is approximately 8.5 miles downstream of the site. A sample was collected at this location because Terre Blue is a major tributary to Big River, even though it has no tailings piles in its drainage basin. Therefore, it was considered a background location. Sediment sample 118 contained 4.4 mg/kg lead and 5.8 mg/kg nickel, while all other metals of concern were below detection limits. No metals of concern were detected in surface water sample 218. These results indicate that background conditions exist on Terre Bleue Creek.

Samples 119 and 219 were collected on Big River approximately 10 miles downstream of the site. Results of sediment sample 119 detected arsenic at 5.5 J mg/kg, cadmium at 6.1 mg/kg, lead at 610 mg/kg, nickel at 13 mg/kg, and zinc at 370 mg/kg. Surface water sample 219 results indicated 26 J μg/l total lead, 8.2 J μg/l dissolved lead, 91 μg/l total zinc, and 62 μg/l dissolved zinc. These results indicate that heavy metal concentrations in sediment and surface water are decreasing downstream; however, they remain elevated.

Turkey Creek is the farthest downstream tributary to Big River that drains a tailings pile in the Old Lead Belt. It drains at least the west section of the Bonne Terre pile. An abandoned rail spur follows the creek north from the town of Bonne Terre. This spur is constructed of tailings that were observed to be in contact with Turkey Creek in several locations. It appears that tailings are easily eroded off of the spur and deposited into the creek. Samples 117 and 217 were collected from Turkey Creek approximately 1,500 upgradient of the Big River confluence. Sediment sample 117 contained 11 mg/kg arsenic, 37 mg/kg cadmium, 44 mg/kg cobalt, 8,700 mg/kg lead, 58 mg/kg nickel, and 1,500 mg/kg zinc. Surface water sample 217 detected total lead at 22 μg/l, dissolved lead at 11 μg/l, and zinc was undetected for total and dissolved; however, the detection limits are elevated to 34 U μg/l and 31 U μg/l, respectively. Therefore, it can be concluded Turkey Creek is also contributing significantly elevated sediment and surface water to Big River.

The farthest downstream samples (120 and 220) collected on Big River were taken approximately 15 miles downstream of the site and approximately 1.25 miles downstream of the Turkey Creek confluence. Results of sediment sample 120 indicate lead at 680 mg/kg and zinc at 290 mg/kg. All other metals of concern were undetected. Surface water sample 220 detected total lead at 49 J μg/l, dissolved lead at 11 J μg/l, total zinc at 70 μg/l, and dissolved zinc at 39 μg/l. It appears that the Big River sediment and surface water are influenced by Turkey Creek when a comparison is made of the data upgradient (119, 219) and downgradient (120, 220) of the Turkey Creek confluence.

An evaluation of the data collected along more than 30 miles of the Big River and its tributaries confirms the assumption that the heavy metal contamination is a regional problem. The data indicate that the major sources contributing to the contamination other than the site include the Leadwood pile tributary, Owl Creek, Flat River, and Turkey

Creek. However, the data also indicate that the Big River site is the major source of tailings that physically enter the river. This is substantiated by the extremely elevated levels of heavy metals found in the river sediments at the site and directly downstream. Other sources contribute heavy metal-laden tailings, but the data suggests that they do not contribute to nearly the same extent as the Big River Mine Tailings site.

The data also indicated that the tributaries draining other mining waste areas contain substantial amounts of lead and zinc in their surface water. Without an analysis of average annual streams flow for each tributary compared to Big River as well as a comparison of average contaminant levels in these tributaries and Big River, it is difficult to assess exactly what percentages each source releases to Big River. Although, for site assessment purposes, the data do establish relative elevated levels of heavy metals along Big River. Therefore, it is obvious that the Leadwood tributary, upgradient of the site, elevates the heavy metal content of the river water above background, but it is also apparent that the Big River Mine Tailings site elevates the heavy metal content in the river water even higher than the Leadwood tributary. For example, dissolved lead increases from undetected in sample 203, downstream of the Leadwood tributary and upstream of the site on Big River, to 4.8 μg/l in sample 212D on the east side of the site. Dissolved zinc similarly in-creases from undetected in sample 203 to 99 μg/l in sample 212D. Similar increases of contaminants occur downstream of the Flat River and Turkey Creek confluences.

The LSI has successfully determined the major sources of contamination entering Big River throughout the site area. Although a much more extensive study of the impact of the entire Old Lead Belt on the Big River drainage basin may be necessary to fully characterize the severity and extent of the regional contamination.

7.3 GROUND WATER

The objectives of the ground water sampling were to characterize the shallow ground water in the tailings on site, as well as the drinking water well at the on-site landfill office and at a nearby residence. Characterization of the regional ground water would require the consideration of each mining waste source. The many miles of open mine shafts created during the mining activities are now filled with ground water. These conditions have certainly altered the natural movement and chemical characteristics of the region's ground water. The U.S. Geological Survey office in Rolla, Missouri is currently conducting a ground water study focusing on the site and regional conditions. Therefore, the focus of the E & E/FIT LSI was limited to the characterization of site-specific ground water conditions.

Because the tailings are a product of mainly carbonate rock and because the underlying Bonneterre Formation is dolomite, the pH of the local ground water is normally slightly alkaline. This condition generally restricts the mobility of metals. Theoretically, significant migration of metals in the ground water should be minimal. However, because landfill leachate characteristically produces organic chelating agents that can solubilize metals, the possibility of the on-site landfill producing leachate and mobilizing the metals in the tailings is a major concern (Novak and Hasselwander 1980). Consequently, sampling was conducted in an attempt to consider the influence of the landfill as well as the tailings to the on-site ground water.

Metals of concern detected in the ground water samples include arsenic, cadmium, cobalt, lead, nickel, and zinc. Concentrations of arsenic, cobalt, and nickel in the soil, tailings, and sediment samples have mainly been considered for comparison due to their elevated presence in some of the on-site ground water samples. Ground water sampling included five springs, four Geoprobe temporary wells, two artesian wells, two private drinking water wells, four monitoring wells, a tunnel, and a leachate seep. See Plates 2 and 3 and Table 6-4 for sample locations and Table 7-4 for sample results.

Four of the spring samples were collected from locations along the perimeter of the site bordering Big River. One background spring was sampled across Big River opposite the site. Shallow ground water is present in the large mound of tailings that lie directly on top of the Bonneterre Formation. Because the tailings are very porous and highly permeable, numerous springs or seeps are present along the edges of tailings bordering Big River. These springs drain directly into the river. The springs that were sampled were located and sampled during a

Table 7-4
Selected Metals in Ground Water Samples
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; July 1990
Sample Series CSXCR

Sample	Arsenic		Cadmium		Cobalt		Lead		Nickel		Zinc	
(µg/l)	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.
300	10U	10U	5.5	5.0U	50U	50U	250J	N/A I	40U	40U	3400	1900
301	10U	10U	5.0U	5.0U	50U	50U	36J	33 J	53	60	180	190
302	10U	10U	5.0U	5.0U	50U	50U	86J	N/A I	40U	40U	98	27
303	21	10U	190	5.0U	85	50U	14000J	N/A I	92	40U	9100	65
304	10U	10U	5.0U	5.0U	50U	50U	63J	20 J	40U	40U	200	160
305	10U	10U	5.0U	5.0U	50U	50U	5.1J	N/A I	40U	40U	20U	20U
306	10U	10U	5.0U	5.0U	400	400	330J	29 J	310	320	8900	6400
307	10U	10U	5.0U	5.0U	50U	50U	17J	14 J	40U	43	140	140
308	10U	10U	5.0U	5.0U	50U	50U	3.0U	N/A I	40U	40U	26	31
309	59	37	6.9	5.0U	50U	50U	680J	4.1U	61	40U	850	520
309D	59	37	8.0	5.0U	50U	50U	650J	3.3U	49	40U	830	550
310	25	17	5.0U	5.0U	50U	50U	23J	3.0U	40U	40U	94	290
311	64	34	11	5.0U	50U	50U	5000J	3.0U	64	40U	530	20U
312	110	10U	37	27	350	360	9300J	60	680	620	26	23000
314	14	10U	5.0U	5.0U	85	55	1700J	74	83	43	470	170
315	14	10U	8.6	5.0U	56	50U	3800J	9.3	70	40U	560	20U
316	46	10U	30	5.0U	170	50U	8200J	46	170	40U	2500	450
317	85	51	26	5.0U	53	50U	10000J	3.0U	60	40U	1400	20U
318	10U	10U	5.0U	5.0U	50U	50U	63J	28	52	86	180	160
319	10U	10U	5.0U	5.0U	50U	50U	43J	4.4U	40U	40U	170	450
320F	10U	---	5.0U	---	50U	---	N/A I	---	40U	---	20U	---
321F	10U	10U	5.0U	5.0U	50U	50U	N/A I	3.0U	40U	40U	20U	20U
322F	10U	10U	5.0U	5.0U	50U	50U	3.2J	3.0U	40U	40U	20U	20U
323F	10U	10U	5.0U	5.0U	50U	50U	N/A I	3.0U	40U	40U	20U	20U
324	10U	10U	5.0U	5.0U	50U	50U	37J	28	51	88	160	170
324F	10U	10U	5.0U	5.0U	50U	50U	N/A I	3.0U	40U	40U	27	20U
325F	10U	---	5.0U	---	50U	---	N/A I	---	40U	---	20U	---

Tot. = Total
Diss. = Dissolved
J - Data reported but not valid by approved QA procedures.
U - Less than measurement detection limit, the associated number is the detection limit.
I - Invalid sample data - value not reported/not available.
Note: See Plates 2 and 3 and Table 6-4 for sample locations and the data transmittal in Appendix D for complete analytical results. Samples 320F and 325F were submitted for total metals analyses only. Sample #313 was not used.

reconnaissance of the site perimeter conducted on the Big River in a johnboat. Samples 300, 302, 303, and 304 were collected from the on-site springs. Sample 300 was collected from a spring on the west side of the site near the landfill. Analyses of sample 300 found total lead at 250 J µg/l, dissolved lead was invalid (N/A I), total zinc at 3,400 µg/l, and dissolved zinc at 1,900 µg/l. Note that many of the ground water sample lead results have been invalidated due to the matrix spike recovery being out of control limits and that most other lead results are J coded due to the blank rule. The dissolved zinc concentration in sample 300 was 10 times greater than any of the other spring samples. All of the other springs were a significant distance from the landfill, which suggests that the landfill may be influencing the ground water at this location.

Sample 302, collected from a spring on the northeast edge of the site, contained 86 J µg/l total lead, invalid dissolved lead, 98 µg/l total zinc, and 27 µg/l dissolved zinc. Sample 303, taken near the major collapse area on the east side of the site, contained 21 µg/l total arsenic, undetected dissolved arsenic, 190 µg/l total cadmium, undetected dissolved cadmium, 85 µg/l total cobalt, undetected dissolved cobalt, 14,000 J µg/l total lead, invalid dissolved lead, 92 µg/l total nickel, undetected dissolved nickel, 9,100 µg/l total zinc, and 65 µg/l dissolved zinc. The presence of arsenic, cadmium, cobalt, and nickel only in the total analysis and not in the dissolved as well as the high total lead and zinc concentrations in sample 303 indicates this sample may have contained significant suspended sediment. Sample 304 was collected near the east edge of the site and contained 63 µg/l total lead, 20 J µg/l dissolved lead, 200 µg/l total zinc, and 160 µg/l dissolved zinc. It can be concluded from these sample results that the numerous springs or seeps flowing from the site into Big River transport significant quantities of total and dissolved lead and zinc, further elevating metals levels in the Big River water.

Sample 318 was collected from a spring on Big River across from the west side of the site and was assumed to be a background location. However, analytical results reported total lead at 63 J µg/l, dissolved lead at 28 µg/l, total nickel at 52 µg/l, dissolved nickel at 86 µg/l, total zinc at 180 µg/l, and dissolved zinc at 160 µg/l. These high concentrations could represent natural ground water conditions or that the site or past mining activities, has influenced the shallow ground water across Big River. The constituents and concentrations in sample 318 are comparable to the results on ground water samples collected from the artesian wells (samples 301 and 324). Lead, nickel, and zinc were the only metals detected in these three samples, and the concentrations are similar. All three samples were also collected in the same general area. Therefore, it is possible that the source of the contamination at these three locations is the same.

The two artesian wells (samples 301 and 324) are approximately 1,000 feet west of the southwest edge of the site along the east bank of Owl Creek. As previously discussed, these wells are actually abandoned exploration borings that were drilled by the mining company in order to vertically characterize zones of mineralization in the Bonneterre Formation. Therefore, it can be assumed that the borings extend into the Bonneterre; however, total depths are unknown. Topographically, these wells are at least 60 feet below the southwest portion of the site (USGS 1982). Refer to the topographic map of site in Appendix H. Therefore, shallow ground water from the elevated tailings may be influencing this area as it migrates from the site. Sample 301 contained total lead at 36 J μg/l, dissolved lead at 33 J μg/l; total nickel at 53 μg/l, dissolved nickel at 60 μg/l; total zinc at 180 μg/l and dissolved zinc at 190 μg/l. Results from sample 324 were very similar with total lead at 37 J μg/l, dissolved lead at 28 μg/l; total nickel at 51 μg/l, dissolved nickel at 88 μg/l; total zinc at 160 μg/l and dissolved zinc at 170 μg/l. Again, these concentrations are very similar to sample 318.

The four Geoprobe temporary wells (samples 314, 315, 316, and 317) were installed along the northwest, north, and northeast areas of the tailings. They were emplaced in the tailings in these areas in order to characterize the shallow ground water in an area that is probably not influenced by the landfill. The well locations are approximately 25 to 35 feet lower topographically than the thicker portions of the tailings pile immediately to the south. All of the metals of concern were detected in the total metals analysis; however, the results discussion will focus on the dissolved metals only. The concentrations of total metals in the samples are extremely high and are more of a reflection of the inability of the Geoprobe well point (screen) to filter out a substantial amount of the suspended solids. Therefore, a significant amount of the finer grained tailings entered the screen and were collected in the total metals sample. Table 7-4 lists the total metals results: Dissolved metals detected in sample 314 include 55 µg/l cobalt, 74 µg/l lead, 43 µg/l nickel, and 170 µg/l zinc. Lead at 9.3 µg/l was the only dissolved metal detected in sample 315. Dissolved metals in sample 316 included 46 µg/l lead and 450 µg/l zinc. Arsenic at 51 µg/l was the only dissolved metal found in sample 317. The dissolved metals concentrations found in these samples, with the exception of the invalid dissolved lead samples, are similar to the concentrations found in the springs sampled (302, 303, and 304) on site, in areas not adjacent to the landfill.

A total of five samples, including a duplicate, were collected from four monitoring wells. There are six monitoring wells around the landfill; however, two were dry. The monitoring wells were installed in 1987, at MDNR request, in order to monitor the shallow ground water around the landfill. Samples 309, 309D, 310, 311, and 312 were sampled from monitoring wells on the north, east, and south edges of the landfill (See Plate 3). Total metals concentrations are extremely high and variable in the monitoring well samples, probably due to suspended solids, as with the Geoprobe temporary well samples. Therefore, only dissolved metals results will be discussed. Table 7-4 lists total metals results for comparison. Arsenic and zinc were the only dissolved metals detected in samples 309, 309D, 310, and 311. In these samples, dissolved arsenic ranged from 17 µg/l to 37 µg/l, with a mean of 31.2 µg/l, and dissolved zinc ranged from un-detected to 550 µg/l, with a mean of 340 µg/l. However, in sample 312, located on the east edge of the landfill, dissolved metals detected include 27 µg/l cadmium, 360 µg/l cobalt, 60 µg/l lead, 620 µg/l nickel, and 23,000 µg/l zinc. These extremely elevated dissolved metals concentrations are very similar to the concentrations found in the landfill leachate seep (sample 306). Consequently, it appears that the landfill is influencing the ground water at sample 312 (well DG-2). Because sample 311 (well DG-3) is within 100 feet of the landfill leachate seep sample 306, it would be anticipated that the ground water in DG-3 would be similar to the leachate seep; however, results do not indicate this. This may be due to the fact that DG-3 was nearly dry, with only a 1.25 foot water column. Also, recharge to the well was very slow and did not exceed the 1.25 foot column. Hence, the water in DG-3 may not be representative of the ground water at that location.

The leachate seep sample 306 was collected at the entrance to the drainage tunnel into which it drains. The tunnel trends southwest/northeast, is approximately 1,500 feet in length, and drains water from the south entrance to the north exit. Sample 319 was collected at the exit location. Water flow through the tunnel at the time of sampling was very slow but continuous. The leachate seep sample 306 contained 400 µg/l total cobalt, 400 µg/l dissolved cobalt, 330 J µg/l total lead, 29 J µg/l dissolved lead, 310 µg/l total nickel, 320 µg/l dissolved nickel, 8900 µg/l total zinc, and 6400 µg/l dissolved zinc. Cadmium was the only metal of concern that was not found at extremely elevated concentrations in sample 306, that was also found in sample 312 from monitoring well DG-2. The extremely high levels of dissolved cobalt, nickel, and zinc in samples 306 and 312 are indicative of landfill leachate mobilizing metals. Lead is also elevated in these samples, however, not as extremely. Results of sample 319, collected at the tunnel exit, indicate total lead at 43 J µg/l, undetected dissolved lead, total zinc at 170 µg/l, and dissolved zinc at 450 µg/l. Concentrations are much lower in sample 319, collected at the tunnel exit, probably due to dilution of the water as it is transported through the tunnel. Additional sampling of the leachate and the tunnel water is needed to fully characterize the tunnel water and determine the exact path of the leachate flow.

Two private drinking water wells were also sampled. Sample 307 was collected from the on-site landfill office well, and sample 308 was collected from the Kennedy residence, located approximately 750 feet south of the landfill office off site. Sample 307 contained 17 J µg/l total lead, 14 J µg/l dissolved lead, 43 µg/l dissolved nickel, 140 µg/l total zinc, and 140 µg/l dissolved zinc. Sample 308 is considered background and contained only 26 µg/l total zinc and 31 µg/l dissolved zinc. No total lead was detected in 308 and dissolved lead was invalidated. The landfill well is 216 feet deep, and the Kennedy well is between 200 and 300 feet deep; therefore, they are drawing from similar levels in the Bonneterre aquifer. The dissolved lead, nickel, and zinc found at elevated levels in the landfill well, but not in the Kennedy well, suggests that the site is influencing the deeper ground water on site. The proposed MCL for lead in drinking water is 5 µg/l; samples collected from the landfill well contained lead concentrations significantly above this level.

Sample 305 was taken from what was originally thought to be a spring but was later determined to be a tributary carring effluent from RESCO Products into Big River. RESCO operates a quarry at their facility. The only contaminant found in sample 305 was total lead at 5.1 J µg/l. However, the pH of the sample was 10.62. Further inquiry into RESCO operations is warranted. This sample was taken approximately 500 feet downstream of the North Desloge river access (Plate 3) and several miles downstream of the site. It was intended as a background location and, therefore, does not have any impact on the site study.

Six QA/QC samples were submitted. These included: two field blanks, a trip blank, an acid blank, a rinsate sample of a bailer, and a rinsate sample of Geoprobe pipe. All metals of concern were non-detected in these samples except for 3.2 J µg/l total lead in field blank sample 322F and 27 µg/l total zinc in sample 324F from the rinsate of the Geoprobe pipe.

It is evident from the data results that the shallow ground water over the majority of the site contains elevated levels of dissolved lead and zinc. A significant amount of the shallow ground water flows out of springs or seeps along the perimeter of the site. Most of these springs transport the contaminated water directly into Big River. It is also apparent from the data that the landfill leachate is mobilizing metals of concern. This is particularly conclusive in leachate sample 306 taken on the south edge of the landfill and monitoring well sample 312 from the east edge of the landfill area. Both of these samples contained extremely high concentrations of cobalt, lead, nickel, and zinc. Sample 312 also contained elevated cadmium. None of the other ground water samples collected on site contained comparable dissolved metal concentrations. Although spring sample 300, collected on the west edge of the landfill area, contained dissolved zinc at 1,900 μg/l; dissolved lead was invalidated for the sample. This indicates that the landfill may also be influencing the shallow ground water on the southwest edge of the site.

Three ground water samples (301, 324, and 318) were collected from two artesian wells and a spring that are all located to the west of the landfill area just off site. All of these samples contained significant amounts of total and dissolved lead, nickel, and zinc. The proposed MCL of 5 μg/l for lead is exceeded in all of these samples. The MCL for nickel is 100 μg/l. Dissolved nickel was found at 60 μg/l in 301, 86 μg/l in 318, and 88 μg/l in 324. Therefore, concentrations of nickel are very close to the MCL in samples 318 and 324. The landfill drinking water well (sample 307) contained dissolved lead at 14 J μg/l, dissolved nickel at 43 μg/l, and dissolved zinc at 140 μg/l. The proposed MCL for lead is exceeded in this well. It should be noted that the landfill well is located in the same general area, near the landfill, as the artesian wells and spring sample 318, and it contains the same contaminants as these samples.

7.4 AIR

The objectives of the air sampling effort were to determine if tailings are released to the ambient air on site and if they are migrating off site. On-site air quality is a concern as there are seven on-site workers (four landfill workers and three full-time workers at the Morgan and White facility). Additionally, many people use the site for all terrain vehicle recreation. The town of Desloge is adjacent to the site on the southeast side and many people reside to the south and east of the site. During a January 1988 site reconnaissance, the E & E/FIT observed a tailings plume migrating from the site to the east. Because the tailings consist of dust, silt, and sand-sized particles and no vegetation is present on a majority of the site, the tailings migrate readily via wind erosion in the same manner as sand dunes. There is an obvious west to east migration of the tailings due to wind erosion. The people potentially affected, the predominant wind direction, and the location of other tailings piles were the main factors considered in the placement of the Hi-vol samplers (Table 6-5).

Hi-vol samplers 1 and 2 were the co-located samplers and were set up approximately 800 feet east of the site. Refer to Plates 1 and 3 and Table 6-5 for Hi-vol locations. These samplers were set up directly downgradient of the major west to east movement of the tailings. Hi-vol 3 was set up on site in the northeast section. This sampler was set at this location to determine ambient air conditions on site and away from the heavy vehicle traffic area near the landfill. Hi-vol 4 was placed on site approximately 150 feet north of the landfill office. This location was chosen to determine on-site ambient air conditions in the vicinity of the landfill operations. Hi-vol 5 was located approximately 1.25 miles east of the site. This location was selected in order to monitor the ambient air in a downgradient direction at least one mile from the site. Hi-vol 6 was set up approximately one mile west-southwest of the site. This location was chosen to sample the ambient air between the Leadwood tailings pile and the site. Hi-vol 7 was placed approximately four miles west of the site. This location was chosen as a remote background location. All of the off-site Hi-vols were placed in relatively remote locations in pastures or grass-covered meadows in order to minimize the possibility of interference from adjacent areas.

A meteorological station was set up in an open area approximately in the middle of the site. Every 15 minutes, it recorded the wind direction, wind speed, temperature, barometric pressure, and relative humidity. The meteorological station collected data continuously from the start to the finish of the project.

The Hi-vol samplers were run from 1200 to 2400 hours each day for six consecutive days. It should be noted that wind speeds were very low for the majority of the sampling. Results would vary considerably in higher wind speed conditions.

The primary metals of concern detected were arsenic, cadmium, lead, and zinc. Table 7-5 summarizes the analytical results for the selected metals of concern. A complete list of metals detected is available in the data transmittal included as Appendix D. The analytical data results were reported in total micrograms (µg) per filter. Therefore, these values have been converted to micrograms per cubic meter ($\mu g/m^3$) by division with the sample volume collected and were also adjusted to

Table 7-5
Selected Metals in Air Samples ($\mu g/m^3$)
Big River Mine Tailings Site
E & E/FIT; July 1990
Sample Series CSXCR

Date and Sample #	Hi-Vol Sampler	Arsenic	Cadmium	Lead	Zinc
7/23/90					
400	#1	0.001U	0.001U	0.008	0.014
402	#2	0.001U	0.001U	0.020	0.019
403	#3	0.001U	0.001U	0.015	0.011
404	#4	0.003	0.006	0.569	0.261
405	#5	NA	NA	NA	NA
406	#6	NA	NA	NA	NA
*407	#7	0.001U	0.001U	0.008	0.015
408	Field Blank	-----	-----	-----	-----
7/24/90					
409	#1	0.001U	0.001	0.030	0.024
410	#2	0.001U	0.000U	0.046	0.028
411	#3	0.001U	0.001	0.057	0.035
412	#4	0.001U	0.008	0.802	0.380
413	#5	0.001U	0.001	0.054	0.058
414	#6	0.001U	0.001	0.027	0.020
*415	#7	0.001U	0.000U	0.020	0.022
416	Field Blank	-----	-----	-----	-----
7/25/90					
417	#1	0.001U	0.001	0.011	0.026
418	#2	0.001U	0.001	0.023	0.025
419	#3	0.001U	0.003	0.044	0.036
420	#4	NA	NA	NA	NA
421	#5	0.001U	0.000U	0.127	0.031
422	#6	0.001U	0.000U	0.020	0.020
*423	#7	0.001U	0.000U	0.006	0.033
424	Field Blank	-----	-----	-----	-----
7/26/90					
425	#1	0.001U	0.001	0.053	0.050
426	#2	0.001U	0.001	0.068	0.047
427	#3	0.001U	0.001	0.082	0.053
428	#4	0.001U	0.009	1.088	0.473
429	#5	0.001U	0.000U	0.100	0.043
430	#6	0.001U	0.001	0.036	0.024
*431	#7	0.001U	0.000U	0.013	0.027
432	Field Blank	-----	-----	-----	-----

Table 7-5 (Continued)
Selected Metals in Air Samples ($\mu g/m^3$)
Big River Mine Tailings Site
E & E/FIT; July 1990
Sample Series CSXCR

Date and Sample #	Hi-Vol Sampler	Arsenic	Cadmium	Lead	Zinc
7/27/90					
433	#1	0.001U	0.001	0.027	0.040
434	#2	0.001U	0.001U	0.024	0.037
435	#3	0.002	0.004	0.294	0.171
436	#4	0.001U	0.004	0.429	0.232
437	#5	0.001U	0.000	0.050	0.482
438	#6	0.001U	0.000U	0.022	0.024
*439	#7	0.001U	0.000U	0.016	0.028
440	Field Blank	-----	-----	-----	-----
7/28/90					
441	#1	0.001U	0.001U	0.031	0.031
442	#2	0.001U	0.001U	0.016	0.024
443	#3	0.001U	0.001U	0.023	0.026
444	#4	0.001	0.001U	0.190	0.054
445	#5	0.001U	0.001	0.059	0.064
*446	#6	0.001U	0.001U	0.035	0.025
448	#7	0.002	0.008	0.066	0.069
449	Field Blank	-----	-----	-----	-----

* Background location for that day
N/A: No available data due to Hi-vol malfunction

Note: Locations 1 and 2 are duplicate samples. Concentrations of compounds detected in the field blanks were subtracted from the total sample weight prior to division of sample volume. Sample numbers 401 and 447 were not used. See Plates 1 and 3 and Table 6-5 for sample locations. See Appendix D for complete analytical results and Appendix J for calibration sheets, conversions of air data to $\mu g/m^3$ and windroses for each day.

standard temperature and pressure. Appropriate Hi-vol calibration sheets, calculations of standard volumes of ambient air for each Hi-vol sample, original data (µg/filter) for all metals, and concentrations in air $\mu g/m^3$ for all metals is available in Appendix J. A blank sample was also prepared each sampling period. If a metal was found above detection limits in the blank, then that amount was subtracted from the sample. If the metal was not detected in the sample blank, then one-half of the detection limit for that metal was subtracted from the sample.

The predominant wind for each sampling period was determined using the wind speed and wind direction data collected by the meteorological station. VROSE software by Bowman Environmental Engineering was used to construct a windrose which illustrates wind direction and wind speed for each day. Therefore, a background and a downwind direction can be determined for each day. A windrose for each day is included in Appendix J. Table 7-5 specifies a background Hi-vol location based on this data for each day.

It should be noted that after the Hi-vol samplers were set up and sampling had commenced, construction work using heavy equipment began approximately 500 to 750 feet south of Hi-vol 5, located approximately 1.25 miles east of the site. Several inconsistent results in samples from Hi-vol 5 are apparent in the data. Due to the noted interference from the construction work and the data results, sample results from Hi-vol 5 will be listed in Table 7-5, but will not be considered attributable to the site.

On July 23, 1990, the predominant wind direction was from southwest to northeast. Wind speed was between 3.3 to 5.4 meters per second (m/s) from this direction. Sample 407, collected at Hi-vol location 7 was chosen as the background sample. Sample 407 contained undetected arsenic and cadmium, 0.008 $\mu g/m^3$ lead, and 0.015 $\mu g/m^3$ zinc. Hi-vol 4 (sample 404) collected on site near the landfill office, was the only sample that contained metals at concentrations significantly over background. Sample 404 contained 0.003 $\mu g/m^3$ arsenic, 0.006 $\mu g/m^3$ cadmium, 0.569 $\mu g/m^3$ lead, and 0.261 $\mu g/m^3$ zinc. Samples from Hi-vol location 4 consistently had significant elevated metals results and in most cases were much higher than samples from Hi-vol 3, the other on-site Hi-vol. This is due to the routine landfill traffic and heavy equipment operation in the vicinity of the landfill. Dust from the everyday operations at the landfill obviously increases the suspended tailings particulates on the landfill portion of the site. No results are available for samples 405 and 406 from the Hi-vols 5 and 6, respectively, due to Hi-vol malfunction during the sampling period.

The predominant wind direction on July 24, 1990, was determined to be south/southeast based on the windrose evaluation. The wind speed was between 1.8 to 3.3 m/s the majority of the time from the predominant direction. Sample 415 collected at Hi-vol location 7 was chosen as the background sample. Sample 415 results indicated undetected arsenic and cadmium, lead at 0.020 $\mu g/m^3$, and zinc at 0.022 $\mu g/m^3$. Again the highest concentrations found were in sample 412 from Hi-vol 4. Sample 412 results detected cadmium at 0.008 $\mu g/m^3$, lead at 0.802 $\mu g/m^3$, and zinc at 0.380 $\mu g/m^3$. Concentrations of cadmium are also elevated to 0.001 $\mu g/m^3$ in Hi-vol 3 (sample 411) and Hi-vol 1 (sample 409). This data indicates that while wind speeds were relatively low, a sufficient amount of cadmium-laden particulates migrated off site and elevated sample 409 at Hi-vol location 1 which was approximately 800 feet east of the site.

The predominant wind direction on July 25, 1990, was from southeast to northwest. Predominant wind speeds were between 1.8 and 3.3 m/s about half of the sampling period and between 3.3 to 5.4 m/s the other half. Sample 423 collected at Hi-vol location 7 was chosen at background. Concentrations in sample 423 were undetected for arsenic and cadmium, 0.006 $\mu g/m^3$ lead, and 0.033 $\mu g/m^3$ zinc. Samples 417, 418, and 419 from Hi-vols 1, 2, and 3, respectively, had cadmium and lead concentrations elevated above background. Cadmium was found at 0.001 $\mu g/m^3$ in 417, at 0.001 $\mu g/m^3$ in 418, and at 0.003 $\mu g/m^3$ in 419. Lead was detected at 0.011 $\mu g/m^3$ in 417, at 0.023 $\mu g/m^3$ in 418, and 0.044 $\mu g/m^3$ in 419. No sample results from Hi-vol 4 were calculated due to Hi-vol malfunction. Considering wind direction, cadmium and lead appear to be migrating from the southeast area of the site to Hi-vols 1, and 2 off site.

The predominant wind direction on July 26, 1990, was determined to be from the south/southwest to north/northeast. The highest wind speeds were from the southwest between 3.3 to 5.4 m/s. Hi-vol location 7 (sample 431) was chosen as background. Results from sample 431 indicated undetected arsenic and cadmium, 0.013 $\mu g/m^3$ lead, and 0.027 $\mu g/m^3$ zinc. On-site Hi-vols 3 and 4 (samples 427 and 428) and downwind, off site, co-located Hi-vols 1 and 2 (samples 425 and 426) all contained elevated concentrations of cadmium, lead, and zinc during this sampling period. Sample 428 at Hi-vol 4 had the highest concentrations detected during the study with cadmium at 0.009 $\mu g/m^3$, lead at 1.088 $\mu g/m^3$, and zinc at 0.473 $\mu g/m^3$. Sample 426 collected at Hi-vol 2 contained 0.001 $\mu g/m^3$ cadmium, 0.068 $\mu g/m^3$ lead, and 0.047 $\mu g/m^3$ zinc. Sample 426 at Hi-vol 1 contained similar concentrations. The on-site and downwind results collected during this sampling period are conclusive evidence that a significant amount of heavy metal-laden particulates from the tailings are being released to the ambient air on site and are being transported at least 800 feet off site.

The predominant wind direction on July 27, 1990, was from west/southwest to east/northeast. The majority of the wind from this direction was in the range 3.3 to 5.4 m/s. Sample 439 at Hi-vol location 7 was used as the background for this sampling period. Results from sample 439 indicated undetected arsenic and cadmium, 0.016 $\mu g/m^3$ lead, and 0.028 $\mu g/m^3$ zinc. Both on-site Hi-vols 3 and 4 had elevated cadmium, lead, and zinc in their samples. Sample 435 (Hi-vol 3) contained 0.002 $\mu g/m^3$ arsenic, 0.004 $\mu g/m^3$ cadmium, 0.294 $\mu g/m^3$ lead and 0.171 $\mu g/m^3$ zinc. Sample 436 (Hi-vol 4) contained 0.004 $\mu g/m^3$ cadmium, 0.429 $\mu g/m^3$ lead, and 0.232 $\mu g/m^3$ zinc. Off-site, co-located Hi-vol locations 1 and 2 also had slightly elevated concentrations of cadmium, lead, and zinc. Hi-vol 1 (sample 433) contained 0.001 $\mu g/m^3$ cadmium, 0.027 $\mu g/m^3$ lead, and 0.040 $\mu g/m^3$ zinc; Hi-vol 2 (sample 434) contained similar concentrations. This data also concludes that tailings are being released into the ambient air on and off site.

On July 28, 1990, the wind direction varied from east to south to west. Therefore, a definite predominant wind direction is very difficult to determine. Refer to windrose 7-28-90 in Appendix J. It can be concluded that the wind was primarily from a southeast, south or southwest direction. Wind speed was mostly 1.8 to 3.3 m/s from the southeast and 3.3 to 5.4 m/s from the south and southwest. Hi-vol location 6 (sample 446) was chosen as background. However, because of the low wind speeds and the lack of a definite predominant wind direction, most of the samples this sampling period did not contain elevated levels of metals of concern. Sample 446 contained undetected arsenic and cadmium, 0.035 $\mu g/m_3$ lead, and 0.025 $\mu g/m^3$ zinc. Due to the wind direction, sample 448 at Hi-vol location 7 was apparently influenced by the Leadwood tailings pile during this period. Sample 448 contained 0.002 $\mu g/m^3$ arsenic, 0.008 $\mu g/m^3$ cadmium, 0.066 $\mu g/m^3$ lead, and 0.069 $\mu g/m^3$ zinc. These results reinforce the fact that this is a regional problem and not site specific. It should be noted that Hi-vol 4 (sample 444) located on the landfill area contained its lowest concentrations on this day. This is partly due to low wind speeds although the main factor was probably that July 28, 1990, was a Saturday. The landfill closed at noon that Saturday which was when sampling began. Therefore, the effects of the landfill daily operations can be realized when previous results are compared to these results. Sample 444 contained 0.001 $\mu g/m^3$ arsenic, undetected cadmium, 0.190 $\mu g/m^3$ lead, and 0.054 $\mu g/m^3$ zinc.

The LSI air monitoring study was conducted for six consecutive days from July 23 to 28, 1990. Samples were collected for a 12-hour sampling period each day from 1200 to 2400 hours. Wind speeds were low during the entire study period. However, sample results have concluded that the ambient air on site and at least 800 feet off site is being influenced by the Big River Mine Tailings site. Results from July 25, 26, and 27, 1990, contained significantly elevated concentrations of cadmium, lead and zinc in on-site Hi-vols 3 and 4 and in off-site, co-located Hi-vols 1 and 2. The highest concentrations of lead detected was 1.088 $\mu g/m^3$ in Hi-vol 4 on July 26. This does not exceed the National Air Quality Standard of 1.5 $\mu g/m^3$ in a calendar quarter; however, it is very significant when the low wind speeds during the sampling period are considered. It is highly probable that the 1.5 $\mu g/m^3$ standard is exceeded on site and off site during periods of higher wind velocities. Consequently, the greatest potential for exposure is to on-site workers and to residential areas bordering the site to the south and east.

Results from Hi-vol 4 which was placed in the landfill area, indicate that daily landfill operations further increase the amount of suspended particulates in the ambient air at the landfill. Concentrations of heavy metals were consistently higher at this location than any other. The sample (444) collected on the one day the landfill was closed contained the lowest concentrations for this location during the sampling period.

It should be noted that on the last day of sampling the winds were from a southerly direction and the remote, background, Hi-vol 7 sample contained elevated concentrations of metals of concern. This can be attributed to the Leadwood tailings pile that was located south/southeast of the Hi-vol. This emphasizes the fact that the air quality of the area is a regional problem. However, the Big River Mine Tailings site has characteristics that are unique and compound the problem. The site is the largest tailings pile in the area that was not deposited in valleys of dammed drainages. The Leadwood and Federal piles were deposited in this manner, resulting in their present day configuration. The Big River pile was placed on an area that was topographically similar or higher than the surrounding area. Consequently, after deposition of the tailings was complete at Big River, the site was significantly higher topographically than the adjacent area. As a result, particulates from the tailings are easily airborne even in low wind speed conditions. Other tailing piles are elevated or have portions that are above adjacent topography, but are not as large in surface area as the Big River tailings pile.

SECTION 8: SUMMARY AND CONCLUSIONS

The Big River Mine Tailings site is a 600 acre tailings disposal area. It was created during the operation of a lead mine/mill facility that operated between 1929 and 1958 in Desloge, Missouri. The Desloge facility was one of many that once operated in the area known as the Old Lead Belt. The Old Lead Belt encompasses an area of approximately 110 square miles, all of which is within St. Francois County. Numerous tailings piles that contain elevated levels of heavy metals exist throughout the Old Lead Belt. It is obvious that the heavy metals contamination of the surface water, ground water and air of the region has multiple sources. However, the Big River Mine Tailings site has several unique features that make it a major contributor of heavy metal contamination. The results of the LSI indicate that the site is releasing significant levels of heavy metals to the surface water, ground water, and air.

The site is a mounded pile of tailings that is bounded by the Big River on three sides. Because of its unusual location, adjacent to and elevated above Big River, tailings are constantly transported via wind and water erosion into the Big River. There are numerous areas along the perimeter of the site where the river is continuously in contact with the tailings. As a result of this physical setting, a castrophic release of tailings into Big River occurred in 1977. After a heavy rain, a portion of the tailings adjacent to the river on the east side became super saturated and released an estimated 50,000 cubic yards to the river. This was the largest of numerous documented releases. Smaller releases continue daily as the river undercuts and erodes the tailings. Analytical results of sediment and surface water samples collected from Big River and its tributaries verify that the site is a major contributor to heavy metal contamination of Big River.

Another unique feature of the site is the operation of a 60 acre municipal landfill on the southwest portion. Monitoring wells, private wells, abandoned wells, geoprobe temporary wells, springs along the site perimeter as well as leachate seeps, were sampled in order to characterize the ground water near the site. Results of the sampling indicate that elevated levels of heavy metals exist in the shallow ground water over the majority of the site. However, it is also apparent that the landfill leachate is mobilizing metals of concern. The leachate sample and sample 312 taken from a monitoring well adjacent to the landfill contained extremely high concentrations of metals of concern. The drinking water well located on site at the landfill office contained dissolved lead at 14J µg/l which exceeds the proposed MCL for lead.

Because the site is topographically elevated above the adjacent area and tailings are easily air borne via wind erosion, releases of tailings to the ambient air are frequent. A direct release was photo documented during the Preliminary Assessment reconnaissance in January, 1988. At that time, a large plume of tailings extending from the site and moving southeast approximately one mile was visible. Hi vol air samplers were utilized during the LSI to document the air releases. While wind conditions were not optimum, releases of tailings to the ambient air on site and at least 1,500 feet off site were documented. It appears that the daily routine landfill operations on site significantly increase the amount of suspended particulates released to the ambient air. Therefore, the landfill workers and residences adjacent to the site are at the highest risk of exposure from an air release.

The LSI of the Big River Mine Tailings site confirmed that heavy metals contamination in the Old Lead Belt is a regional multi-source problem and identified the Big River Mine Tailings site as a major contributor. The data as well as visual observations have documented heavy metal laden tailings releases to the ground water, surface water, and air from the site.

SECTION 9: BIBLIOGRAPHY

AuBuchon, Bryant, Manager, St. Francois County Landfill, December 1, 1987, personal communication with Robert C. Overfelt, E & E/FIT.

Buckley, E.R., 1908, Geology of the Disseminated Lead Deposits of St. Francois and Washington Countries: Missouri's Bureau of Geology and Mines, 2nd Ser., Vol 8, PA. 1.

Burns and McDonnel Engineers, February 1, 1987, Desloge Tailings Pile Management Plan Study Phase I Report.

Burris, James, Director, MDNR Poplar Bluff Office, February 1, 1988, personal communication with Robert C. Overfelt, E & E/FIT.

Code of Federal Regulations, July 1, 1987, Protection of Environment, 40 Parts 1 to 51.

Czarneski, James, Missouri Department of Conservation, 1984, Accumulation of Lead in Fish from Missouri Streams Impacted by Lead Mining.

Degonia, Danny, Asst. Manager, Bonne Terre Water District, May 12, 1988, telephone conversation with Robert Overfelt, E & E/FIT.

Dickniete, Dan, Environmental Administrator, Missouri Department of Conservation, July 30, 1990, letter to Curt Enos, E & E/FIT.

Emergency Action Plan for Lead Mine Tailing (EAP), 1981, Draft, Desloge, Missouri.

Gale, Nord, et al, 1982, Historical Trends for Lead in Fish, Clams, and Sediments in the Big River of Southeastern Missouri, University of Missouri-Rolla.

Gale, Nord, et al, Lead Concentrations in Edible Fish Fillets Collected from Missouri's Old Lead Belt.

Hedgeworth, Jamera, Leadwood City Hall, May 11, 1988, telephone conversation with Robert C. Overfelt, E & E/FIT.

Hershlach, Robert, April 13, 1987, Resource Conservation, Soil Conservation Service, personal communication with James Burris, MDNR, Poplar Bluff, Missouri.

Howland, John, Missouri Department of Natural Resources, March 1, 1988, telephone conversation with Robert C. Overfelt, E & E/FIT.

Hudwalker, Marvin, Professional Engineer, Hudwalker and Associates, Inc., Farmington, Missouri, February 2, 1988, personal communication with Robert C. Overfelt, E & E/FIT.

Johnson, Dennis, Assistant Manager, Flat River Water and Sewer District, Missouri, December 2, 1987a, telephone conversation with Robert C. Overfelt, E & E/FIT.

Johnson, Dennis, Assistant Manager, Flat River Water and Sewer District, Missouri, December 2, 1987b, personal communication with Robert C. Overfelt, E & E/FIT.

Mattson, C., Project Manager, St. Joe Minerals Corporation, Irvine, California, November 13, 1987, personal communication with Robert C. Overfelt, E & E/FIT.

Missouri Department of Natural Resources (MDNR), 1981, 1982, 1983, Air Quality Data at Flat River, Missouri.

Missouri Division of Geological Survey and Water Resources (MDGSWR), 1961, The Stratigraphic Succession in Missouri.

Missouri Division of Geological Survey and Water Resources (MDGSWR), 1983, Ground Water Maps of Missouri.

National Cooperative Soil Survey, August 1981, Soil Survey of St. Francois County, Missouri.

Novak, John, and Hasselwander, Gerard, January 1980, Control of Mine Tailing Discharges to Big River, University of Missouri-Columbia, Columbia, Missouri.

Price, Bill, Section Chief, Technical Services and Training Division, Public Drinking Water Program, July 1, 1991, telephone conversation with Kevin Snowden, E & E/FIT.

St. Francois County Tax Assessor, August 1, 1983, Aerial Photographic Map #74-07-7.

Schmitt, C. and Finger S., 1982, The Dynamics of Metals from Past and Present Mining Activities in the Big and Black River Watersheds, Southeastern Missouri, National Fisheries Research Laboratory, Columbia, Missouri.

Soil Conservation Service (SCS), August 1981, Soil Survey of St. Francois County, Missouri.

Tilley, Joyce, June 2, 1988, Terre DuLac Utilities Corp., letter to Steve Vaughn, E & E/FIT.

U.S. Census Bureau, June 26, 1991, telephone conversation with Carolyn Schneider, E & E/FIT.

U.S. Department of Commerce (USDC), 1979, Climatic Atlas for the United States, Washington, D.C.

U.S. Environmental Protection Agency (EPA), July 1976, Quality Criteria for Water, Washington, D.C.

U.S. Environmental Protection Agency (EPA), March 1989, Graphical Exposure Modeling System, Washington, D.C.

U.S. Environmental Protection Agency, Office of Water, April 1991, Drinking Water Regulations and Health Advisories, Washington, D.C.

U.S. Geologic Survey, 1982, 7.5 Minute Topographic Series, Bonne Terre and Flat River Quadrangles, Missouri.

U.S. Geological Survey, 1988, Assessment of Water Quality in Non-Coal Mining Areas of Missouri, Water Resources Investigation Report #87-4286.

Warren, Ron, Superintendent, Flat River Water and Sewer District, November 12, 1988, telephone conversation with Robert C. Overfelt, E & E/FIT.

Wixon, B.G., et al, University of Missouri-Rolla, December 1983, A Study of the Possible use of Chat and Tailings from the Old Lead Belt of Missouri for Agriculture Limestone.

APPENDIX A

PLATES 1,2, AND 3

Unscanned Items

A map or maps that could not be scanned
exist with this document
or as a document
To view the maps, please contact the
Superfund Records Center

APPENDIX B

TECHNICAL DIRECTIVE DOCUMENT

RECEIVED

RO

1A. Cost Center: FT 1307	MAR 19 1991 FIT ZONE II CONTRACT Contract Number 68-01-7347 TECHNICAL DIRECTIVE DOCUMENT (TDD) E&E K.C.K.	2. TDD Number: F -07-9004-001
1B. Account Number: FM00616XA		2A. Amendment: * [X] Administrative [ ] Technical

3A. Priority: [X] High [ ] Medium [ ] Low	3B. Key EPA Contact: Name: Greg Reesor Phone: 551-7695

4A. Estimate of Technical Hours:	4B. Subcontract:	4C. Estimate of Subcontract Cost:	5A. SSID Number:	5B. CERID Number:
* 1,516	None	N/A	Unassigned	MOD981126899

5C. EPA Site Name:	5D. City/County/State:
Big River Mine Tailings	Desloge/St. Francois/Missouri

6. Desired Report Format:	7A. Activity Start Date:	7B. Estimated Completion Date:
[ ] Formal Report [ ] Standard Report [ ] Other (Specify): ____ [X] Letter Report [ ] Formal Briefing	4/25/90	8/1/91

8A. Type of Activity:	8B. FIT/SCAP Goal: Will Deliverable Meet a Unit of the Goal?
[ ] PA [ ] RCRA-PA [ ] HRS Support [ ] Enforcement Support [ ] Training [ ] SI [ ] RCRA-SI [ ] QA Support [ ] Program Management [ ] General Technical Assistance [X] ESI [ ] Special Studies [ ] Equipment Maintenance	[X] Yes [ ] No

9. General Task Description: Conduct a listing site inspection at the Big River Mine Tailings site located in Desloge, Missouri, to eliminate datagaps from previous work.

10. Specific Elements:	11. Interim Deadlines:
1) Prepare work plan (memo).	
2) Conduct field work after approval of work plan by EPA.	
3) Prepare trip report.	
4) Prepare final report and update EPA SI form 2070-13 (formal report for final report).	4) 4/15/91
[ ] Additional Scope Attached	

12. Comments: * Additional 200 hours needed to complete final report.

13. Authorizing: Pete Culver (Signature)	[X] RPO [ ] DPO [ ] PO	14. Date: 3/18/91
15. Received by: Sharon P. Martin (Contractor FITOM Signature)	[X] Accepted [ ] Accepted with Exceptions (Attached) [ ] Rejected	16. Date: 3/19/91

Distribution: Sheet 1 (White)--FITOM Copy; Sheet 2 (Green)--RPO Copy; Sheet 3 (Canary)--ZPM, WDC Copy; Sheet 4 (Pink)--PO, WDC Copy; Sheet 5 (Goldenrod)--CO, WDC Copy

F001A097

APPENDIX C

SITE CONTACTS AND PROPERTY OWNERS

Site Contacts and Property Owners

Marvin Hudwalker
Engineer
Hudwalker and Associates, Inc.
505 Potosi St.
PO Box 676
Farmington, MO 63640

Carol Kennedy
Rt. 33, Box 27
Flat River, MO 63601

Lee Glore
Rt. 33, Box 160
Flat River, MO 63601

J.E. Pratte
PO Box 1526
Desloge, MO 63601

David Callahan
PO Box 1614
Desloge, MO 63601

Howard Wood
RR 2, Box 612
Bonne Terre, MO 63628

Marie Banks
Rt. 33, Box 59
Flat River, MO 63601

Harold Stoffel
Rt. 4, Box 146
Boone Terre, MO 63628

Leonard Whitehead
1685 St. Francois Road
Terre Du Lac, MO 63628

Carl and Trina Valley
Rt. 2, Box 628B
Mineral Point, MO 63660

Robert Kyle
Rt. 33, Box 31
Flat River, MO 63601

Mary Bullock
Rt. 2, Box 167
Bonne Terre, MO 63628

Bryant AuBuchon
Landfill Manager
St. Francois County ENvironmental Corporation
Desloge, MO
(314) 431-4768

C.G. Mattson
Project Manager
St. Joe Minerals Corporation
Irvine, CA
(714) 975-5269

Jim Burris
Director-Poplar Bluff Regional Office
Missouri Department of Natural Resources
Poplar Bluff, MO
(314) 785-0832

Greg Reesor
Superfund contact
U.S. EPA-Region VII
Kansas City, KS
(913) 551-7695

Paul McDowell
Rt. 2, Box 77
Bonne Terre, MO 63628

Edvar Weible
558 Capri Drive
Bonne Terre, MO 63628

Rebecca Forrester
Rt. 33, Box 19
Flat River, MO 63601

Mr. Goff
107 N. 8th
Desloge, MO 63601

APPENDIX D

EPA DATA TRANSMITTAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

DATE: OCT 4 1990

MEMORANDUM

SUBJECT: Data Transmittal for Activity #: CSXCR,
Site Description: Big River Mine Tailings

FROM: Andrea Jirka AJ
Chief, Laboratory Branch, ENSV

TO: Robert Morby
Chief, Superfund Branch, WSTM

ATTN: Greg Peesot

Attached is the data transmittal for the above referenced site. These data have met all quality assurance requirements unless indicated otherwise in a data package. This should be considered a ___ Partial or X Complete data transmittal (completes transmittal of 9/4 and 9/12/90). If you have any modified data 9/17/90 and questions or comments, please contact Dee Simmons at 236-3881.

Attachments

cc: Data Files
Ann Melia, E&E/FIT

NOTE: Please see Mary Gerken, SPFD-WSTM, if you want an electronic copy of the data.

RECYCLE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY KANSAS 66115

Date: 10/4/90

MEMORANDUM

SUBJECT: Data Transmittal for Activity #: CSXCR,
Site Description: Big River Mine Tailings

FROM: Andrea Jirka AJ
Chief, Laboratory Branch, ENSV

TO: Greg Reesor
SPFD-WSTM

Attached is the data transmittal for the above referenced site. These data have met all quality assurance requirements unless indicated otherwise in the data package. This is a Modified Data Transmittal; these data are modified and differ from data previously transmitted. If you have any questions or comments, please contact Dee Simmons at 236-3881.

Attachment

cc: Data File
Ann Molia, E&E FIT

MODIFIED DATA: Data were modified for the following reason(s):
incorrect data were generated in LAST.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: Albert Iannacone
ESAT QA Coordinator
THRU: Ronald Ross
ESAT Manager

DATE: August ~~20~~ 29 aD, 1990
SUBJECT: Review of inorganic data for **Big River Mine Tailings**

TID# 07-9003-329
ASSIGNMENT# **572**
ICF ACCT# 302-26-329-02
NSI S.O.# 4633-3292
ESAT Doc.# ESAT-VII-329-08-A-90-01

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," and the Region VII Inorganic Data Review Training Manual as guidance. The following comments and attached data sheets are a result of the ESAT review of the above mentioned data from the contract laboratory.

SAS CASE NO.: 5558G
SITE: BIG RIVER MINE TAILINGS
REVIEWER: Al Iannacone
MATRIX: Soil

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR

SMO Sample No.	EPA Sample No.	SMO Sample No.	EPA Sample No.
5558G1	CSXCR001	555 ~~MGG~~8G11	CSXCR011
5558G2	CSXCR002	~~MGG~~8G12	CSXCR012
5558G3	CSXCR003	~~MGG~~8G13	CSXCR013
5558G4	CSXCR004	~~MGG~~8G14	CSXCR014
5558G5	CSXCR005	~~MGG~~8G15	CSXCR015
5558G6	CSXCR006	~~MGG~~8G16	CSXCR016
5558G7	CSXCR007	~~MGG~~8G17	CSXCR017
5558G8	CSXCR008	~~MGG~~8G18	CSXCR018
5558G9	CSXCR009	~~MGG~~8G19	CSXCR019
5558G10	CSXCR010	~~MGG~~8G20	CSXCR020

And associated QC samples CSXCR914C, -914A, and -914L. JM

GENERAL

This data review assignment covers Twenty Soil samples analyzed for total metals. No field blank nor field duplicate, and three QC samples were included in this assignment. Chain-of-custody paperwork is complete, although sample tags were absent.

1. Holding Times and Preservation

A. Holding time requirements are not defined for soil samples, and preservatives are not added to them for metals analyses.

2. Calibration

A. Calibration criteria were met for all samples, for both initial and continuing calibrations.

3. Method Blanks / Field Blanks

Matrix	Sample #	Analytes Detected	Samples Qualified as non-detect
Soil	Cont. Cal. Blank	Al,As,Ca,Fe, Mg,Mn,Se,Ag,Zn	Se in CSXCR002 Ag in CSXCR002,-3, -4, -6, -7, -8, -11
Soil	Prep.Blank	Cr, Cu	Cr in CSXCR010

4. Matrix Spike

A. Spike % recoveries were outside limits for Sb (low), Ba (high), and Pb (high). All detected values of these metals were "J" coded as a result. Affected samples were:

Antimony (Sb): CSXCR007 (others nondetect)
Barium (Ba): CSXCR001, -012 thru -020 (others nondetect)
Lead (Pb): All samples

A potential for a high bias in the lead data is likely given the high percent recovery noted (170% versus control limits of 75% to 125%).

5. Interference Check Sample

Met applicable criteria.

6. Laboratory Control Sample

Met applicable criteria.

7. **Duplicates**

A. Duplicates met applicable criteria, indicating acceptable precision was obtained during these analyses, except for high RPDs noted for the following metals, leading to "J" coding of detected values; affected samples are noted:

Barium (Ba):	Samples -01, -12 thru -20 (others nondetect)
Calcium (Ca):	All samples but -12 (-12 was nondetect)
Chromium (Cr):	Samples -01, -12 thru -20 (others nondetect)
Manganese (Mn):	All samples
Nickel (Ni):	Samples -02, -03, -05 thru -11, -14, -15, -18, and -19 (others nondetect)

8. **ICP Serial Dilution**

A. All applicable criteria were met.

9. **Furnace AA QC**

A. Correlation coefficients for samples analyzed by method of standard additions were unacceptable for several samples for Se; "J" data qualification resulted for Se in these samples: CSXCR003, -04, -06, -13, -14, -15, -16, -20.

10. **Calculations Verification**

A. Soil data appear appropriately adjusted for % moisture.

B. Per regional guidance, low level detected data below the Contract Required Detection Limit (CRDL) were reported as nondetect at the CRDL, including in blank samples.

Summary

This data package is acceptable in terms of requirements for overall accuracy, precision and completeness, although individual outliers resulted in qualification of data as nondetect or as "J" coded in some cases.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: Kevin Ludwikoski aD for KL
ESAT Data Reviewer
THRU: Ronald A. Ross
ESAT Team Manager

DATE: August ~~22~~ 30, aD 1990
SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 563
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision and the Region VII Inorganic Data Review Training Manual as guidance.

The following comments and attached data sheets are a result of the ESAT review of the above mentioned data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: Kevin Ludwikoski

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: Solid

TOTAL METALS		TOTAL METALS	
SMO Sample No.	EPA Sample No.	SMO Sample No.	EPA Sample No.
5558G21	CSXCR021	5558G31	CSXCR100
5558G22	CSXCR022	5558G32	CSXCR101
5558G23	CSXCR023	5558G33	CSXCR102
5558G24	CSXCR024	5558G34	CSXCR103
5558G25	CSXCR025	5558G35	CSXCR104
5558G26	CSXCR026	5558G36	CSXCR105
5558G27	CSXCR027	5558G37	CSXCR106
5558G28	CSXCR028	5558G38	CSXCR107
5558G29	CSXCR029	5558G39	CSXCR108
5558G30	CSXCR030	5558G40	CSXCR109

GENERAL

This data review assignment covers twenty soil samples analyzed for TOTAL METALS for case number 5558G. All results are in mg/kg because of the method used for the analyses. There were no field blanks, field duplicates, or performance samples included with this assignment.

1. Technical Holding Times / Preservation

Technical holding times were observed for all analytes.

2. Initial and Continuing Calibration

All percent recoveries were within control limits.

3. Blanks

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

TOTAL METALS

Analyte	5 x Highest Blank (mg/kg)	Qualified Samples
Al	63.4	None qualified
Sb	31.0	CSXCR021-CSXCR030, CSXCR100-109, CSXCR027L
Be	1.0	CSXCR021,-022,-023,-024,-025, -026,-028,-029,-030, and 100-109 inclusive
Ca	88.8	None qualified.
Cr	7.1	CSXCR021,-027,-027L,-028,-029 -102,-104,-105,-106,-107,-108
Co	8.5	CSXCR028,-029,-100, and 104-109 inclusive.
Cu	8.8	CSXCR025,-028,-029,-100,-101,-103 -104,-106,-107,-108
Fe	31.8	None qualified
Mg	86.7	None qualified
Tl	2.2	All samples except CSXCR027S and CSXCR919C
Zn	17.0	None qualified

4. ICP Interference Check

Recoveries of solution AB analytes from the interference check samples were within 20% of the true values.

5. **Laboratory Control Standard (LCS)**

LCS results for all analytes were within control limits.

6. **Duplicates**

A lab duplicate was performed and one analyte was outside the control limits. The associated results were "J" coded accordingly.

TOTAL METALS
(SOLIDS)

Analyte	Samples qualified
As	CSXCR029,-030,-100,-101,-103,-105,-106,-107,-109 -027S and -919C

The As results were also coded because of matrix spike recoveries.

7. **Matrix Spike Sample**

As was out of range for matrix spike recovery. The samples that had data qualified are listed below.

TOTAL METALS
(SOLIDS)

Analyte	Sample No.	Code
As	CSXCR029,-030,-100,-101,-103,-105,-106,-107 -109,-027L and -919C	J

The As results were also coded because of duplicate precision.

8. **ICP Serial Dilutions**

Results for Cu and Zn were outside control limits. The samples that were qualified are listed below.

Analyte	Sample No.	Code
Cu	CSXCR021,-022,-023,-024,-026,-027,-027S,-027L -028,-030,-102,-104,-105,-106,-109 and -919C.	J
Zn	All samples	J

9. Furnace Atomic Absorbtion

The correlation coefficient for furnace AA standard additions analysis of Se in sample CSXCR022 was below 0.995. The analyte result was non-detect and no action was taken.

10. Summary

Some results were qualified by the blank rule. One analyte was qualified by matrix spike recoveries. One analyte was also qualified by duplicate precision. One analyte was qualified by the standard addition rule and three analytes were qualified by serial dilution rules.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: Kevin Ludwikoski af for KL
ESAT Data Reviewer
THRU: Ronald A. Ross
ESAT Team Manager

DATE: August ~~20~~ 30 ap, 1990
SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 562
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision and the Region VII Inorganic Data Review Training Manual as guidance.

The following comments and attached data sheets are a result of the ESAT review of the above mentioned data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: Kevin Ludwikoski

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: Solid

TOTAL METALS SMO Sample No.	TOTAL METALS EPA Sample No.	TOTAL METALS SMO Sample No.	TOTAL METALS EPA Sample No.
5558G41	CSXCR110	5558G49	CSXCR117
5558G42	CSXCR111	5558G50	CSXCR118
5558G43	CSXCR112	5558G51	CSXCR119
5558G44	CSXCR112D	5558G52	CSXCR120
5558G45	CSXCR113		
5558G46	CSXCR114		
5558G47	CSXCR115		
5558G48	CSXCR116		

GENERAL

This data review assignment covers twelve soil samples analyzed for TOTAL METALS for case number 5558G. All results are in mg/kg because of the method used for the analyses. There was one field duplicate included with this assignment. There were no field blank or performance samples included with this assignment.

1. Technical Holding Times / Preservation

Technical holding times were observed for all analytes.

2. Initial and Continuing Calibration

All percent recoveries were within control limits.

3. Blanks

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

TOTAL METALS

Analyte	5 x Highest Blank (mg/kg)	Qualified Samples
Al	74.9	None qualified
As	5.2	CSXCR118,-118L,-120
Be	1.3	CSXCR110,-111,-112,-112D,-113, -114,-116,-117,-118,-119,-120
Ca	80.1	None qualified.
Cd	4.0	CSXCR118,-120
Cu	12.4	CSXCR110,-112,-112D,-113,-114 -118,-119,-120
Fe	14.3	None qualified
Mg	91.2	None qualified
Ag	4.5	CSXCR111,-112,-113,-114,-116 -118,-119,-120
V	5.4	None qualified
Zn	14.4	CSXCR118

4. ICP Interference Check

Recoveries of solution AB analytes from the interference check samples were within ±20% of the true values.

5. Laboratory Control Standard (LCS)

LCS results for all analytes were within control limits.

6. Duplicates

A lab duplicate was performed and two analytes were outside the control limits. The associated results were "J" coded accordingly.

TOTAL METALS
(SOLIDS)

Analyte	Samples qualified
Ba	CSXCR110,-111,-115,-116,-117,-118
Mn	All samples

The Ba results were also coded because of matrix spike recoveries.

7. **Matrix Spike Sample**

Ba and Ag were out of range for matrix spike recovery. The samples that had data qualified are listed below.

TOTAL METALS
(SOLIDS)

Analyte	Sample No.	Code
Ba	CSXCR110,-111,-115,-118	J
Ag	CSXCR110,-112,-112D,-113,-114,-115,-116,-117	J

The Ba results were also coded because of duplicate precision.

8. **ICP Serial Dilutions**

All serial dilution results were within control limits.

9. **Furnace Atomic Absorbtion**

The correlation coefficient for furnace AA standard additions analysis of As in sample CSXCR119 was below 0.995. The analyte result was therefore "J" coded.

10. **Summary**

Some results were qualified by the blank rule. Two analytes were qualified by matrix spike recoveries. Two analytes were also qualified by duplicate precision. One analyte was qualified by the standard addition rule.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor

THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: Albert Iannacone AI
ESAT QA Coordinator

THRU: Ronald Ross
ESAT Manager

DATE: August 23, 1990

SUBJECT: Review of inorganic data for **Big River Mine Tailings**

TID# 07-9003-329
ASSIGNMENT# **571**
ICF ACCT# 302-26-329-02
NSI S.O.# 4633-3292
ESAT Doc.# ESAT-VII-329-08-23-90-01

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," and the Region VII Inorganic Data Review Training Manual as guidance. The following comments and attached data sheets are a result of the ESAT review of the above mentioned data from the contract laboratory.

SAS CASE NO.: 5558G
SITE: BIG RIVER MINE TAILINGS
REVIEWER: Al Iannacone
MATRIX: Water

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR

SMO Sample No.	EPA Sample No.	SMO Sample No.	EPA Sample No.
5558G133	CSXCR208	MGG8G141	CSXCR216
5558G134	CSXCR209	MGG8G142	CSXCR217
5558G135	CSXCR210	MGG8G143	CSXCR218
5558G136	CSXCR211	MGG8G144	CSXCR322F
5558G137	CSXCR212	MGG8G145	CSXCR323F
5558G138	CSXCR213	MGG8G146	CSXCR324
5558G139	CSXCR214	MGG8G147	CSXCR324F
5558G140	CSXCR215	MGG8G199	CSXCR212D

And six associated QC samples: CSXCR916A,C,M and -208L,S,R.

GENERAL

This data review assignment covers Sixteen Water samples analyzed for dissolved metals. Three field blanks and one field duplicate, and six associated QC samples were included in this assignment. Chain-of-custody paperwork is complete, although sample tags were absent.

1. Holding Times and Preservation

A. Holding time requirements and preservation requirements were met for these metals analyses.

2. Calibration

A. Calibration criteria were met for all samples, for both initial and continuing calibrations.

3. Method Blanks / Field Blanks

Matrix	Sample #	Analytes Detected	Samples Qualified as non-detect
Water	Laboratory Blanks	Al, Cr, Cu, Fe, Tl, V	Cr in CSXCR217
Water	CSXCR322F	Ca, Na	none
Water	CSXCR323F	Mg	none
Water	CSXCR324F	Zn	CSXCR211; -217

4. Matrix Spike

A. Met applicable criteria except for low % recovery for Se; no data were affected due to this occurrence.

5. Interference Check Sample

Met applicable criteria.

6. Laboratory Control Sample

Met applicable criteria.

7. Duplicates

A. Lab and field duplicates met applicable criteria, indicating acceptable precision was obtained during these analyses.

8. ICP Serial Dilution

A. All applicable criteria were met.

9. Furnace AA QC

A. Acceptance criteria were met; Pb was successfully analyzed by the method of standard additions for sample CSXCR324.

10. Calculations Verification

A. Due to the requested level of review, no detailed examination of calculations was performed.

B. Per regional guidance, low level detected data below the Contract Required Detection Limit (CRDL) were reported as nondetect at the CRDL, including in blank samples.

Summary

This data package is acceptable in terms of requirements for overall accuracy, precision and completeness.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: Albert Iannacone AI
ESAT QA Coordinator
THRU: Ronald Ross
ESAT Manager

DATE: August 22, 1990
SUBJECT: Review of inorganic data for **Big River Mine Tailings**

TID# 07-9003-329
ASSIGNMENT# **570**
ICF ACCT# 302-26-329-02
NSI S.O.# 4633-3292
ESAT Doc.# ESAT-VII-329-08-23-90-02

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," and the Region VII Inorganic Data Review Training Manual as guidance. The following comments and attached data sheets are a result of the ESAT review of the above mentioned data from the contract laboratory.

SAS CASE NO.: 5558G
SITE: BIG RIVER MINE TAILINGS
REVIEWER: Al Iannacone
MATRIX: Water

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR

SMO Sample No.	EPA Sample No.	SMO Sample No.	EPA Sample No.
5558G73	CSXCR219	MGG8G83	CSXCR308
5558G74	CSXCR220	MGG8G84	CSXCR309
5558G75	CSXCR300	MGG8G85	CSXCR309D
5558G76	CSXCR301	MGG8G86	CSXCR310
5558G77	CSXCR302	MGG8G87	CSXCR311
5558G78	CSXCR303	MGG8G88	CSXCR312
5558G79	CSXCR304	MGG8G89	CSXCR314
5558G80	CSXCR305	MGG8G90	CSXCR315
5558G81	CSXCR306	MGG8G91	CSXCR316
5558G82	CSXCR307	MGG8G92	CSXCR317

And 13 associated QC samples: CSXCR915A,C,M, -219L,S,R, -220L,S,R, -301L,S,R, and -309D.

GENERAL

This data review assignment covers Twenty Water samples analyzed for total metals. No field blank and one field duplicate, and 13 associated QC samples were included in this assignment. Chain-of-custody paperwork is complete, although sample tags were absent.

1. Holding Times and Preservation

A. Holding time requirements and preservation requirements were met for these metals analyses.

2. Calibration

A. Calibration criteria were met for all samples, for both initial and continuing calibrations.

3. Method Blanks / Field Blanks

Matrix	Sample #	Analytes Detected	Samples Qualified as non-detect
Water	Laboratory Blanks	Sb, As, Ca, Cr, Cu, Fe, Tl	Sb in CSXCR316 Cu in CSXCR312, -314, and -317.

4. Matrix Spike

Met applicable criteria.

5. Interference Check Sample

Met applicable criteria.

6. Laboratory Control Sample

Met applicable criteria.

7. Duplicates

A. Lab duplicates met applicable criteria, indicating acceptable precision was obtained during these analyses, except for high RPD noted for Lead in CSXCR220L, leading to "J" coding of detected values; the only affected sample is CSXCR308; others are all nondetect for Pb.

B. Field duplicates CSXCR009 / -009D generally exhibited good agreement, except for Ni; however, the lack of agreement was not sufficient to result in "J" data coding of Ni data.

8. ICP Serial Dilution

A. All applicable criteria were met.

9. Furnace AA QC

A. Correlation coefficients for samples analyzed by method of standard additions were unacceptable for As and Pb in several samples; "J" data qualification resulted only for Pb in CSXCR305, however, as the other affected samples were nondetect. Post-digestion spike outliers did not result in any data coding as affected results were nondetect.

10. Calculations Verification

A. Due to the requested level of review, no detailed examination of calculations was performed.

B. Per regional guidance, low level detected data below the Contract Required Detection Limit (CRDL) were reported as nondetect at the CRDL, including in blank samples.

Summary

This data package is acceptable in terms of requirements for overall accuracy, precision and completeness, although individual outliers resulted in qualification of data as nondetect or as "J" coded in some cases.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor

THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland
ESAT Data Reviewer

THRU: Ronald A. Ross
ESAT Team Manager

DATE: August 21, 1990

SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 567
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292
ESAT Document # ESAT-VII-329-08-23-90-08

These data were reviewed primarily according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision with changes given in the Region VII Inorganic Data Review Training Manual and EPA memorandums.

The following comments and attached data sheets are a result of the ESAT review, according to EPA policies, of the following data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: D. Eric Woodland

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: WATER

TOTAL METALS SMO Sample No.	TOTAL METALS EPA Sample No.	TOTAL METALS SMO Sample No.	TOTAL METALS EPA Sample No.
5558G53	CSXCR200	5558G63	CSXCR210
5558G54	CSXCR201	5558G64	CSXCR211
5558G55	CSXCR202	5558G65	CSXCR212
5558G56	CSXCR203	5558G66	CSXCR213
5558G57	CSXCR204	5558G67	CSXCR214
5558G58	CSXCR205	5558G68	CSXCR215
5558G59	CSXCR206	5558G69	CSXCR216
5558G60	CSXCR207	5558G70	CSXCR217
5558G61	CSXCR208	5558G71	CSXCR218
5558G62	CSXCR209	5558G72	CSXCR219

GENERAL

This data review assignment covers TWENTY WATER samples analyzed for TOTAL METALS for case number 5558G. There were no field blanks, duplicates or performance samples included with this assignment.

1. Technical Holding Times / Preservation

Technical holding times were within established control limits.

2. Initial and Continuing Calibration

All percent recoveries were within control limits.

3. Blanks

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

TOTAL METALS

Analyte	5 x Highest Blank (ug/l)	Qualified Samples
Al	440	CSXCR201,-203 to -206,-208 to -210, -214,-217 and -219
Sb	160	None qualified
Be	7.0	None qualified
Cd	22	CSXCR202
Cr	29	CSXCR218
Cu	44	None qualified
Fe	120	None qualified
Ni	140	None qualified
Zn	38	CSXCR218
As	10	None qualified
Ca	340	None qualified
Mg	320	None qualified

4. ICP Interference Check

Recoveries of solution AB analytes were within control limits.

5. Laboratory Control Standard (LCS)

LCS results were within established control limits.

6. Duplicates

The RPDs for all analytes were within control limits.

7. **Matrix Spike Sample**

Matrix spike recoveries were within established control limits.

8. **ICP Serial Dilution**

All results were within established control limits.

9. **Summary**

Several results were qualified by the blank rule. No other qualifications were made.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland EV
ESAT Data Reviewer
THRU: Ronald A. Ross
ESAT Team Manager

DATE: August 21, 1990
SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 569
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292
ESAT Document # ESAT-VII-329-08-23-90-09

These data were reviewed primarily according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision with changes given in the Region VII Inorganic Data Review Training Manual and EPA memorandums.

The following comments and attached data sheets are a result of the ESAT review, according to EPA policies, of the following data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: D. Eric Woodland
LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: WATER

DISSOLVED METALS

SMO Sample No.	EPA Sample No.
5558G102	CSXCR219
5558G103	CSXCR220
5558G104	CSXCR300
5558G105	CSXCR301
5558G106	CSXCR302
5558G107	CSXCR303
5558G108	CSXCR304
5558G109	CSXCR305
5558G110	CSXCR306
5558G111	CSXCR307
5558G112	CSXCR308

TOTAL METALS

SMO Sample No.	EPA Sample No.
5558G93	CSXCR318
5558G94	CSXCR319
5558G95	CSXCR320F
5558G96	CSXCR321F
5558G97	CSXCR322F
5558G98	CSXCR323F
5558G99	CSXCR324
5558G100	CSXCR324F
5558G101	CSXCR325F

GENERAL

This data review assignment covers ELEVEN WATER samples analyzed for DISSOLVED METALS and NINE WATER samples analyzed for TOTAL METALS for case number 5558G. There were six field blanks for TOTAL METALS and no field duplicates or performance samples included with this assignment.

1. Technical Holding Times / Preservation

Technical holding times were within established control limits.

2. Initial and Continuing Calibration

All percent recoveries were within control limits.

3. Blanks

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

DISSOLVED METALS

Analyte	5 x Highest Blank (ug/l)	Qualified Samples
Cu	41	None qualified
Fe	110	None qualified
Pb	8.0	CSXCR300,-302 and -303
Zn	24	None qualified
Al	200	None qualified
Co	44	None qualified

TOTAL METALS

Analyte	5 x Highest Blank (ug/l)	Qualified Samples
Cu	41	None qualified
Fe	400	CSXCR318 and -319
Pb	16	None qualified
Al	200	None qualified
Co	44	None qualified
Ca	3300	None qualified
Mg	1000	None qualified
Na	3400	None qualified
Tl	11	None qualified
Zn	130	None qualified
Mn	16	None qualified

4. **ICP Interference Check**

Recoveries of solution AB analytes were within control limits.

5. **Laboratory Control Standard (LCS)**

LCS results were within established control limits.

6. **Duplicates**

The RPDs for all analytes were within control limits.

7. **Matrix Spike Sample**

The matrix spike results were applied to the total and dissolved sample results. Pb, Se and Tl were out of control limits for matrix spike recovery. All Se and Tl results were non-detect, so no coding was performed for these analytes. CSXCR318,-319,-322F and 324 were coded J for TOTAL PB and CSXCR219,-220,-301,-304,-306 and -307 were J coded for DISSOLVED PB. All other TOTAL and DISSOLVED PB results were invalidated.

8. **ICP Serial Dilution**

All results were within established control limits.

9. **Furnace Criteria**

CSXCR318 was J coded for a MSA correlation coefficient outlier. This results was also coded by matrix spike recovery.

10. **Summary**

All Pb results were either J coded or invalidated by the matrix spike recovery. Two results for TOTAL Fe were qualified by the blank rule. Several DISSOLVED Pb results were qualified by the blank rule and later invalidated by matrix spike recovery. CSXCR318 was also coded by MSA correlation coefficient.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor

THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland
ESAT Data Reviewer

THRU: Ronald A. Ross
ESAT Team Manager

DATE: August 21, 1990

SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 568
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292
ESAT Document # ESAT-VII-329-08-23-90-10

These data were reviewed primarily according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision with changes given in the Region VII Inorganic Data Review Training Manual and EPA memorandums.

The following comments and attached data sheets are a result of the ESAT review, according to EPA policies, of the following data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: D. Eric Woodland

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: WATER

DISSOLVED METALS		DISSOLVED METALS	
SMO Sample No.	EPA Sample No.	SMO Sample No.	EPA Sample No.
5558G113	CSXCR309	5558G123	CSXCR319
5558G114	CSXCR309D	5558G124	CSXCR321F
5558G115	CSXCR310	5558G125	CSXCR200
5558G116	CSXCR311	5558G126	CSXCR201
5558G117	CSXCR312	5558G127	CSXCR202
5558G118	CSXCR314	5558G128	CSXCR203
5558G119	CSXCR315	5558G129	CSXCR204
5558G120	CSXCR316	5558G130	CSXCR205
5558G121	CSXCR317	5558G131	CSXCR206
5558G122	CSXCR318	5558G132	CSXCR207

GENERAL

This data review assignment covers TWENTY WATER samples analyzed for DISSOLVED METALS for case number 5558G. There was one field duplicate and no field blanks or performance samples included with this assignment.

1. **Technical Holding Times / Preservation**

Technical holding times were within established control limits.

2. **Initial and Continuing Calibration**

All percent recoveries were within control limits.

3. **Blanks**

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

DISSOLVED METALS

Analyte	5 x Highest Blank (ug/l)	Qualified Samples
Ca	2600	None qualified
Cr	22	None qualified
Cu	41	None qualified
Tl	12	None qualified
Ag	10	None qualified
Pb	7.0	CSXCR207,-204,-309,-309D and 319
Mg	700	None qualified
Na	2100	None qualified

4. **ICP Interference Check**

Recoveries of solution AB analytes were within control limits.

5. **Laboratory Control Standard (LCS)**

LCS results were within established control limits.

6. **Duplicates**

The RPDs for all analytes were within control limits.

7. **Matrix Spike Sample**

Se was out of control limits for matrix spike recovery. All results for Se were non-detect, so no coding was performed.

8. **ICP Serial Dilution**

All results were within established control limits.

9. **Summary**

Several Pb results were qualified by the blank rule. No other qualifications were made.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor

THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland
ESAT Data Reviewer

THRU: Ronald A. Ross
ESAT Team Manager

DATE: August ~~21~~ 23rd, 1990

SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 566
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292
ESAT Document # ESAT-VII-329-08-23-90-04

These data were reviewed primarily according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision with changes given in the Region VII Inorganic Data Review Training Manual and EPA memorandums.

The following comments and attached data sheets are a result of the ESAT review, according to EPA policies, of the following data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: D. Eric Woodland

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: AIR

TOTAL METALS

SMO Sample No.	EPA Sample No.
5558G192	CSXCR400
5558G193	CSXCR402
5558G194	CSXCR403
5558G195	CSXCR404
5558G196	CSXCR406
5558G197	CSXCR407
5558G198	CSXCR408

GENERAL

This data review assignment covers SEVEN AIR samples analyzed for TOTAL METALS for case number 5558G. There were no field blanks, duplicates or performance samples included with this assignment.

1. Technical Holding Times / Preservation

Technical holding times have not been established for this matrix.

2. Initial and Continuing Calibration

All percent recoveries were within control limits.

3. Blanks

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

TOTAL METALS

Analyte	5 x Highest Blank (ug/sample)	Qualified Samples
Al	74	CSXCR407
As	4.2	None qualified
Ca	80	None qualified
Cr	5.2	CSXCR406,-404 and -403
Cu	13	None qualified
Fe	18	None qualified
Mg	97	None qualified
Tl	3.0	None qualified
Pb	1.0	CSXCR408

4. ICP Interference Check

Recoveries of solution AB analytes were within control limits.

5. Laboratory Control Standard (LCS)

LCS results were within established control limits.

6. Duplicates

The RPDs for all analytes were within control limits.

7. **Matrix Spike Sample**

Because of the matrix, matrix spikes of the samples are not possible. A spike was performed on a blank. These results were within regular CLP control limits.

8. **ICP Serial Dilution**

Copper was outside control limits. All results were J coded except for CSXCR408, which was non-detect.

9. **Furnace Atomic Absorption**

CSXCR406 for Se was outside control limits for MSA correlation coefficient. This result was J coded.

10. **Summary**

One result was coded for MSA correlation coefficient outlier. Most of the Cu results were J coded for a serial dilution outlier.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland
ESAT Data Reviewer
THRU: Ronald A. Ross
ESAT Team Manager

DATE: August ~~21~~ 23, 1990
SUBJECT: Review of inorganic data for Big River Mine Tailings.
TID# 07-9003-329
ASSIGNMENT# 564
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292
ESAT Document # ESAT-VII-329-08-23-90-06

These data were reviewed primarily according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision with changes given in the Region VII Inorganic Data Review Training Manual and EPA memorandums.

The following comments and attached data sheets are a result of the ESAT review, according to EPA policies, of the following data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: D. Eric Woodland

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: AIR

TOTAL METALS SMO Sample No.	EPA Sample No.	TOTAL METALS SMO Sample No.	EPA Sample No.
5558G148	CSXCR433	5558G158	CSXCR443
5558G149	CSXCR434	5558G159	CSXCR444
5558G150	CSXCR435	5558G160	CSXCR445
5558G151	CSXCR436	5558G161	CSXCR446
5558G152	CSXCR437	5558G162	CSXCR448
5558G153	CSXCR438	5558G163	CSXCR449
5558G154	CSXCR439	5558G168	CSXCR417
5558G155	CSXCR440	5558G169	CSXCR418
5558G156	CSXCR441	5558G170	CSXCR419
5558G157	CSXCR442	5558G171	CSXCR420

GENERAL

This data review assignment covers TWENTY AIR samples analyzed for TOTAL METALS for case number 5558G. There were no field blanks, duplicates or performance samples included with this assignment.

1. Technical Holding Times / Preservation

Technical holding times have not been established for this matrix.

2. Initial and Continuing Calibration

All percent recoveries were within control limits.

3. Blanks

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

TOTAL METALS

Analyte	5 x Highest Blank (ug/sample)	Qualified Samples
Al	48	None qualified
Sb	28	None qualified
Be	1.6	None qualified
Ca	70	None qualified
Cu	7.3	None qualified
Fe	21	None qualified
Mg	65	None qualified
Tl	4.3	None qualified
V	5.5	None qualified

4. ICP Interference Check

Recoveries of solution AB analytes were within control limits.

5. Laboratory Control Standard (LCS)

LCS results were within established control limits.

6. Duplicates

The RPDs for all analytes were within control limits.

7. **Matrix Spike Sample**

Because of the matrix, matrix spikes of the samples are not possible. A spike was performed on a blank. These results were within regular CLP control limits.

8. **ICP Serial Dilution**

All results were within limits.

9. **Furnace Atomic Absorption**

CSXCR420 for As and CSXCR434,-435 and -436 for Se were outside control limits for MSA correlation coefficient. These results were J coded.

10. **Summary**

Some results were coded for MSA correlation coefficient outliers. No other QC outliers were found.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland
ESAT Data Reviewer
THRU: Ronald A. Ross
ESAT Team Manager

DATE: August ~~21~~ 23rd, 1990
SUBJECT: Review of inorganic data for Big River Mine Tailings.

TID# 07-9003-329
ASSIGNMENT# 565
ICF ACCT# 26-329-02
NSI S.O.# 4633-3292
ESAT Document # ESAT-VII-329-08-23-90-05

These data were reviewed primarily according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision with changes given in the Region VII Inorganic Data Review Training Manual and EPA memorandums.

The following comments and attached data sheets are a result of the ESAT review, according to EPA policies, of the following data from the contract laboratory.

CASE NO.: 5558G
SITE: Big River Mine Tailings
REVIEWER: D. Eric Woodland

LABORATORY: SILVER
METHOD NO.: CS0788A
EPA ACTIVITY NO.: CSXCR
MATRIX: AIR

TOTAL METALS		TOTAL METALS	
SMO Sample No.	EPA Sample No.	SMO Sample No.	EPA Sample No.
5558G172	CSXCR421	5558G182	CSXCR431
5558G173	CSXCR422	5558G183	CSXCR432
5558G174	CSXCR423	5558G184	CSXCR409
5558G175	CSXCR424	5558G185	CSXCR410
5558G176	CSXCR425	5558G186	CSXCR411
5558G177	CSXCR426	5558G187	CSXCR412
5558G178	CSXCR427	5558G188	CSXCR413
5558G179	CSXCR428	5558G189	CSXCR414
5558G180	CSXCR429	5558G190	CSXCR415
5558G181	CSXCR430	5558G191	CSXCR416

GENERAL

This data review assignment covers TWENTY AIR samples analyzed for TOTAL METALS for case number 5558G. There were no field blanks, duplicates or performance samples included with this assignment.

1. **Technical Holding Times / Preservation**

Technical holding times have not been established for this matrix.

2. **Initial and Continuing Calibration**

All percent recoveries were within control limits.

3. **Blanks**

Several analytes were detected in the blanks. Corresponding sample results were qualified according to the blank rule using five times the highest blank value. Sample results requiring modification are reported as non-detect on the attached data sheets.

TOTAL METALS

Analyte	5 x Highest Blank (ug/sample)	Qualified Samples
Al	63	None qualified
Ca	57	None qualified
Cr	5.8	CSXCR428,-409 and -412
Cu	14	None qualified
Fe	29	CSXCR432
Zn	4.1	None qualified

4. **ICP Interference Check**

Recoveries of solution AB analytes were within control limits.

5. **Laboratory Control Standard (LCS)**

LCS results were within established control limits.

6. **Duplicates**

The RPDs for all analytes were within control limits.

7. **Matrix Spike Sample**

Because of the matrix, matrix spikes of the samples are not possible. A spike was performed on a blank. These results were within regular CLP control limits.

P Serial Dilution

Copper was outside control limits. All results were J coded xcept for CSXCR424,-432 and -416, which were non-detect.

9. Furnace Atomic Absorption

CSXCR425 for Se was outside control limits for MSA correlation coefficient. This result was J coded.

10. Summary

One result was coded for MSA correlation coefficient outliers. Most of the Cu results were J coded for a serial dilution outlier.

TABLE OF CODES

SAMP. NO. = SAMPLE IDENTIFICATION NUMBER
QCC = QUALITY CONTROL SAMPLE/AUDIT CODE
M = MEDIA OF SAMPLE (A=AIR, T=TISSUE, H=HAZARDOUS MATERIAL, S=SEDIMENT/SOIL, W=WATER)
STORET/SAROAD LOC. NO. = A SAMPLING SITE LOCATION IDENTIFICATION NUMBER
BEG. DATE = THE DATE SAMPLING WAS STARTED
BEG. TIME = THE TIME SAMPLING WAS STARTED
END. DATE = THE DATE SAMPLING WAS ENDED
END. TIME = THE TIME SAMPLING WAS STOPPED
A = RESERVED
B = RESERVED
PES = PESTICIDES BY CONTRACT
= DIOXINS/FURANS BY EPA
E = EXPLOSIVES BY CONTRACT
FLD = FIELD MEASUREMENTS BY EPA
G = MINERALS & DISSOLVED MATERIALS BY EPA
HER = HERBICIDES BY EPA
I = ION CHROMATOGRAPHY ANALYSES BY EPA
MC = METALS BY CONTRACT
BNC = BASE NEUTRALS BY CONTRACT
L = FISH PHYSICAL DATA BY EPA
MET = METALS BY EPA
N = FISH TISSUE PARAMETERS BY EPA
VC = VOLATILES BY CONTRACT
P = PESTICIDES BY EPA
Q = FLASH POINT ANALYSES BY EPA
R = RESERVED
BN = SEMIVOLATILE BY EPA
T = CYANIDE PHENOL BY EPA
U = RESERVED
VOA = VOLATILE ORGANICS BY EPA
HC = HERBICIDES BY CONTRACT
X = RESERVED
Y = RESERVED
TRK = ACTIVITY TRACKING PARAMETERS BY EPA

STORET DETECTION IDENTIFIERS
BLANK = NO REMARKS
J = DATA REPORTED BUT NOT VALID BY APPROVED QC PROCEDURES
I = INVALID SAMPLE/DATA - VALUE NOT REPORTED
U = LESS THAN (MEASUREMENT DETECTION LIMIT)
M = DETECTED BUT BELOW THE LEVEL FOR ACCURATE QUANTIFICATION
O = PARAMETER NOT ANALYZED

CONTRACTOR/ IN HOUSE / FIELD		MEDIA GROUPS
FIELD	= * * * * =	AF,HF,SF,TF,WF,ZZ
CONTRACTOR	= * * * =	HA,HC,HJ,HK,HO,SC,SJ,SK,SO,SW,TC,TJ,TK,TO,TW,WA,WC,WE,WJ,WK,WO,WW
IN HOUSE	= * =	ALL OTHERS

QUALITY CONTROL AUDIT CODES
A = TRUE VALUE FOR CALIBRATION STANDARD
B = CONCENTRATION RESULTING FROM DUPLICATE LAB SPIKE
C = MEASURED VALUE FOR CALIBRATION STANDARD
D = MEASURED VALUE FOR FIELD DUPLICATE
F = MEASURED VALUE FOR FIELD BLANK
G = MEASURED VALUE FOR METHOD STANDARD
H = TRUE VALUE FOR METHOD STANDARD
K = CONCENTRATION RESULTING FROM DUPLICATE FIELD SPIKE
L = MEASURED VALUE FOR LAB DUPLICATE
M = MEASURED VALUE FOR LAB BLANK
N = MEASURED VALUE FOR DUPLICATE FIELD SPIKE
P = MEASURED VALUE FOR PERFORMANCE STANDARD
R = CONCENTRATION RESULTING FROM LAB SPIKE
S = MEASURED VALUE FOR LAB SPIKE
T = TRUE VALUE OF PERFORMANCE STANDARD
W = MEASURED VALUE FOR DUPLICATE LAB SPIKE
Y = MEASURED VALUE FOR FIELD SPIKE
Z = CONCENTRATION RESULTING FROM FIELD SPIKE

MEDIA CODES
A = AIR
T = BIOLOGICAL (PLANT & ANIMAL) TISSUE
H = HAZARDOUS MATERIALS/MAN MADE PRODUCTS
S = SEDIMENT, SLUDGE & SOIL
W = WATER

UNITS
NA = NOT APPLICABLE
PG = PICOGRAMS (1 X 10-12 GRAMS)
NG = NANOGRAMS (1 X 10-9 GRAMS)
UG = MICROGRAMS (1 X 10-6 GRAMS)
MG = MILLIGRAMS (1 X 10-3 GRAMS)
M3 = METER CUBED
MPH = MILES PER HOUR
SCM = STANDARD (1 ATM, 25 C) CUBIC METER
KG = KILOGRAM
L = LITER
C = CENTIGRADE DEGREES
SU = STANDARD (PH) UNITS
# = NUMBER
LB = POUNDS
IN = INCHES
M/F = MALE/FEMALE
M2 = SQUARE METER
I.D. = SPECIES IDENTIFICATION
GPM = GALLONS PER MINUTE
CFS = CUBIC FEET PER SECOND
MGD = MILLION GALLONS PER DAY
1000G= FLOW, 1000 GALLONS PER COMPOSITE
UMHOS= CONDUCTIVITY UNITS (1/OHMS)
NTU = TURBIDITY UNITS
PC/L = PICO (1 X 10-12) CURRIES PER LITER
MV = MILLIVOLT
SQ FT= SQUARE FEET
P/CM2= PICOGRAMS PER SQ. CENTIMETER
U/CM2= MICROGRAMS PER SQ. CENTIMETER

EW
9-27-90

ANALYSIS REQUEST SUPPLEMENT REPORT ACTIVITY: O-CSXCR DATE. 09/26/90

COMPOUND	UNITS	216	217	218	219		219L	219R
WF01 WATER TEMP	°C	~~27~~	~~22~~	~~27~~	~~25~~			
WF05 PH. FIELD	SU	~~7.26~~	~~7.58~~	~~7.34~~	~~7.46~~			
WF10 CONDUCTIVITY (FIELD)	UMHOS	~~840~~	~~650~~	~~295~~	~~215~~			
WM01 SILVER BY ICAP	UG/L	10	10	10	10	U	N/A	N/A
WM02 ALUMINUM BY ICAP	UG/L	220	200	360	200	U	N/A	N/A
WM03 ARSENIC BY ICAP	UG/L	10	10	10	10	U	10	40
WM04 BARIUM BY ICAP	UG/L	200	200	200	200	U	N/A	N/A
WM05 BERYLLIUM BY ICAP	UG/L	5.0	5.0	5.0	5.0	U	N/A	N/A
WM06 CADMIUM BY ICAP	UG/L	5.0	5.0	5.0	5.0	U	N/A	N/A
WM07 COBALT BY ICAP	UG/L	50	50	50	50	U	N/A	N/A
WM08 CHROMIUM BY ICAP	UG/L	10	12	10	10	U	N/A	N/A
WM09 COPPER BY ICAP	UG/L	25	25	25	25	U	N/A	N/A
WM10 IRON BY ICAP	UG/L	290	770	460	160		N/A	N/A
WM11 MANGANESE BY ICAP	UG/L	62	17	75	61		N/A	N/A
WM12 MOLYBDENUM BY ICAP	UG/L	N/A	N/A	N/A	N/A	O	N/A	N/A
WM13 NICKEL BY ICAP	UG/L	40	40	40	40	U	N/A	N/A
WM14 LEAD BY ICAP	UG/L	49	22	310	26	J	28	20
WM15 ANTIMONY BY ICAP	UG/L	60	60	60	60	U	N/A	N/A
WM16 SELENIUM BY ICAP	UG/L	5.0	5.0	5.0	5.0	U	5.0	10
WM17 TITANIUM BY ICAP	UG/L	N/A	N/A	N/A	N/A	O	N/A	N/A
WM18 THALLIUM BY ICAP	UG/L	10	10	10	10	U	10	50
WM19 VANADIUM BY ICAP	UG/L	50	50	50	50	U	N/A	N/A
WM20 ZINC BY ICAP	UG/L	1[illegible]0	34	20	91		N/A	N/A
WM21 CALCIUM, TOTAL BY ICAP	MG/L	50	7[illegible]	3[illegible]	51		N/A	N/A
WM22 MAGNESIUM TOTAL BY ICAP	MG/L	27	44	15	28		N/A	N/A
WM23 SODIUM, TOTAL BY ICAP	MG/L	5[illegible]3	79	5[illegible]0	5 8		N/A	N/A

MODIFIED DATA

9-27-90

ANALYSIS REQUEST SUPPLEMENT REPORT   ACTIVITY: O-CSXCR   DATE: 09/26/90

COMPOUND	UNITS	216	217	218	219	219L	219R
WM24 POTASSIUM. TOTAL BY ICAP	MG/L	5.0	1[illegible]	5.0	5.0 U	~~N/A 0~~	~~N/A 0~~
WM35 SILVER.DISSOLVED BY ICAP	UG/L	1[illegible]	1[illegible]	10 U	10		
WM36 ALUMINUM.DISSOLVED BY ICAP	UG/L	2[illegible]0	2[illegible]0	200 U	200		
WM37 ARSENIC.DISSOLVED BY ICAP	UG/L	1[illegible]	1[illegible]	10	10		
WM38 BARIUM.DISSOLVED BY ICAP	UG/L	2[illegible]0	2[illegible]0	200 U	200		
WM39 BERYLLIUM.DISSOLVED BY ICAP	UG/L	5.0	5.0	5.0 U	5.0		
WM40 CADMIUM.DISSOLVED BY ICAP	UG/L	5.0	5.0	5.0 U	5.0		
WM41 COBALT.DISSOLVED BY ICAP	UG/L	5[illegible]	5[illegible]	50 U	50		
WM42 CHROMIUM.DISSOLVED BY ICAP	UG/L	1[illegible]	1[illegible]	10 U	10		
WM43 COPPER.DISSOLVED BY ICAP	UG/L	2[illegible]	25	25 U	25		
WM44 IRON.DISSOLVED BY ICAP	UG/L	1[illegible]0	100	100 U	100		
WM45 MANGANESE.DISSOLVED BY ICAP	UG/L	4[illegible]	1[illegible]	3[illegible]	36		
WM46 MOLYBDENUM.DISSOLVED BY ICAP	UG/L	N/A	N/A	N/A	N/A		
WM47 NICKEL.DISSOLVED BY ICAP	UG/L	4[illegible]	40	40	40		
WM48 LEAD.DISSOLVED BY ICAP	UG/L	9.5	1[illegible]	3.0	8.2		
WM49 ANTIMONY.DISSOLVED BY ICAP	UG/L	6[illegible]	60	60 U	60		
WM50 SELENIUM.DISSOLVED BY ICAP	UG/L	5.0	5.0	5.0	5.0		
WM51 TITANIUM.DISSOLVED BY ICAP	UG/L	N/A	N/A	N/A	N/A		
WM52 THALLIUM.DISSOLVED BY ICAP	UG/L	1[illegible]	10	1[illegible]	10		
WM53 VANADIUM.DISSOLVED BY ICAP	UG/L	5[illegible]	50	5[illegible]	50		
WM54 ZINC.DISSOLVED BY ICAP	UG/L	1[illegible]0	3[illegible]	2[illegible]	62		
WM55 CALCIUM.DISSOLVED BY ICAP	MG/L	5[illegible]	7[illegible]	3[illegible]	53		
WM56 MAGNESIUM.DISSOLVED BY ICAP	MG/L	3[illegible]	48	1[illegible]	29		
WM57 SODIUM.DISSOLVED BY ICAP	MG/L	5.9	7[illegible]	5.0	6.1		
WM58 POTASSIUM.DISSOLVED BY ICAP	MG/L	5.0	1[illegible]	5.0	5.0		
ZZ01 SAMPLE NUMBER	NA	216	217	218	219	219	219

MODIFIED DATA

ANALYSIS REQUEST REPORT

FOR ACTIVITY: CSXCR

S P F D 10/04/90 15:39:22

* LABO APPROVED

FY: 90 ACTIVITY: CSXCR DESCRIPTION: BIG RIVER MINE TAILINGS LOCATION: DESLOGE MISSOURI

STATUS: ACTIVE TYPE: SAMPLING - IN HOUSE ANALYSIS PROJECT: A33

LABO DUE DATE IS 8/13/90. REPORT DUE DATE IS 9/19/90.

INSPECTION DATE: 7/30/90 ALL DATA APPROVED BY LABO DATE: 10/04/90 FINAL REPORT TRANSMITTED DATE: 00/00/00

EXPECTED LABO TURNAROUND TIME IS 14 DAYS EXPECTED REPORT TURNAROUND TIME IS 51 DAYS

ACTUAL LABO TURNAROUND TIME IS 66 DAYS ACTUAL REPORT TURNAROUND TIME IS 0 DAYS

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	# CONT	CITY	STATE	STORET/ SAROAD LOC NO	BEG. DATE	BEG. TIME	END. DATE	END. TIME
001		S	BIG RIVER MINE TAILINGS SITE(SOIL)	1	1	DESLOGE	MISSOURI		07/23/90	17:45	/ /	:
001	L	S		0	0		ALL		/ /	:	/ /	:
001	R	S		0	0		ALL		/ /	:	/ /	:
001	S	S		0	0		ALL		/ /	:	/ /	:
002		S	BIG RIVER MINE TAILINGS SITE(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	15:10	/ /	:
003		S	BIG RIVER MINE TAILINGS SITE(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	:	/ /	:
004		S	BIG RIVER MINE TAILINGS SITE(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	15:30	/ /	:
005		S	BIG RIVER MINE TAILINGS SITE(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	15:50	/ /	:
006		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	16:00	/ /	:
007		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	16:25	/ /	:
008		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	16:25	/ /	:
009		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	16:40	/ /	:
010		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	17:20	/ /	:
011		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/25/90	13:30	/ /	:
012		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/24/90	14:05	/ /	:
013		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/25/90	14:35	/ /	:
014		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/25/90	15:10	/ /	:
015		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/25/90	15:25	/ /	:
016		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/25/90	16:00	/ /	:
017		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/26/90	15:50	/ /	:
018		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/26/90	16:25	/ /	:
019		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/26/90	16:25	/ /	:
020		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/26/90	17:00	/ /	:
021		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/26/90	14:15	/ /	:
022		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/26/90	15:45	/ /	:
023		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	13:45	/ /	:
024		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	14:45	/ /	:

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	# CONT.	CITY	STATE	STORET/ SAROAD LOC NO	BEG. DATE	BEG. TIME	END. DATE	END. TIME
025		S	BIG RIVER MINE TAILINGS(SOIL)	0	0	DESLOGE	MISSOURI		07/28/90	09:30	/ /	:
026		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	09:55	/ /	:
027		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	09:00	/ /	:
027	L	S		0	0		ALL		/ /	:	/ /	:
027	R	S		0	0		ALL		/ /	:	/ /	:
027	S	S		0	0		ALL		/ /	:	/ /	:
028		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	09:30	/ /	:
029		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	10:30	/ /	:
030		S	BIG RIVER MINE TAILINGS(SOIL)	1	1	DESLOGE	MISSOURI		07/27/90	18:00	/ /	:
100		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/23/90	10:00	/ /	:
101		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/23/90	13:15	/ /	:
102		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/23/90	15:45	/ /	:
103		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/23/90	16:20	/ /	:
104		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	09:00	/ /	:
105		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	10:00	/ /	:
106		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	10:30	/ /	:
107		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	13:15	/ /	:
108		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	14:00	/ /	:
109		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	14:45	/ /	:
110		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	13:15	/ /	:
111		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	14:15	/ /	:
112		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	15:30	/ /	:
112	D	S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	15:30	/ /	:
113		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	16:30	/ /	:
114		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/25/90	09:15	/ /	:
115		S	BIG RIVER MINE TAILINGS SITE(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/25/90	10:00	/ /	:
116		S	BIG RIVER MINE TAILINGS(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/25/90	11:30	/ /	:
117		S	BIG RIVER MINE TAILINGS(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/24/90	14:30	/ /	:
118		S	BIG RIVER MINE TAILINGS(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/25/90	14:30	/ /	:
118	L	S		0	0		ALL		/ /	:	/ /	:
118	R	S		0	0		ALL		/ /	:	/ /	:
118	S	S		0	0		ALL		/ /	:	/ /	:
119		S	BIG RIVER MINE TAILINGS(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/25/90	15:30	/ /	:
120		S	BIG RIVER MINE TAILINGS(SEDIMENT)	1	1	DESLOGE	MISSOURI		07/25/90	18:15	/ /	:
200		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/23/90	10:00	/ /	:
201		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/23/90	13:15	/ /	:
202		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/23/90	15:45	/ /	:
203		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/23/90	16:20	/ /	:
204		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	09:00	/ /	:
205		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	10:00	/ /	:
206		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	10:30	/ /	:
207		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	13:15	/ /	:
208		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	14:00	/ /	:
208	L	W		0	0		ALL		/ /	:	/ /	:
208	R	W		0	0		ALL		/ /	:	/ /	:
208	S	W		0	0		ALL		/ /	:	/ /	:
209		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	14:45	/ /	:
210		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	13:15	/ /	:
211		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	14:15	/ /	:
212		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	15:30	/ /	:
212	D	W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	2	DESLOGE	MISSOURI		07/24/90	15:30	/ /	:
213		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/24/90	16:30	/ /	:
214		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	09:15	/ /	:
215		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	10:00	/ /	:

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	# CONT.	CITY	STATE	STORET/ SAROAD LOC NO	BEG. DATE	BEG. TIME	END. DATE	END. TIME
215	L	W		0	0		ALL		/ /	:	/ /	:
215	R	W		0	0		ALL		/ /	:	/ /	:
215	S	W		0	0		ALL		/ /	:	/ /	:
216		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	11:30	/ /	:
217		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	14:30	/ /	:
218		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	14:30	/ /	:
219		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	15:30	/ /	:
219	L	W		0	0		ALL		/ /	:	/ /	:
219	R	W		0	0		ALL		/ /	:	/ /	:
219	S	W		0	0		ALL		/ /	:	/ /	:
220		W	BIG RIVER MINE TAILINGS(SURFACE WATER)	1	5	DESLOGE	MISSOURI		07/25/90	18:15	/ /	:
220	L	W		0	0		ALL		/ /	:	/ /	:
220	R	W		0	0		ALL		/ /	:	/ /	:
220	S	W		0	0		ALL		/ /	:	/ /	:
300		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/24/90	09:00	/ /	:
301		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/24/90	12:50	/ /	:
301	L	W		0	0		ALL		/ /	:	/ /	:
301	R	W		0	0		ALL		/ /	:	/ /	:
301	S	W		0	0		ALL		/ /	:	/ /	:
302		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/ /90	14:15	/ /	:
303		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/24/90	15:15	/ /	:
304		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/24/90	16:00	/ /	:
305		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/25/90	08:45	/ /	:
306		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/25/90	14:15	/ /	:
307		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/26/90	16:00	/ /	:
308		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/26/90	16:40	/ /	:
309		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	08:15	/ /	:
309	D	W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	2	DESLOGE	MISSOURI		07/27/90	08:15	/ /	:
309	L	W		0	0		ALL		07/27/90	:	/ /	:
309	R	W		0	0		ALL		07/27/90	:	/ /	:
309	S	W		0	0		ALL		07/27/90	:	/ /	:
310		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	08:45	/ /	:
311		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	09:35	/ /	:
312		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	09:00	/ /	:
314		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/26/90	16:30	/ /	:
315		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	11:50	/ /	:
316		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	15:00	/ /	:
317		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	16:45	/ /	:
318		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	15:20	/ /	:
318	L	W		0	0		ALL		07/27/90	:	/ /	:
318	R	W		0	0		ALL		07/27/90	:	/ /	:
318	S	W		0	0		ALL		07/27/90	:	/ /	:
319		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	5	DESLOGE	MISSOURI		07/27/90	15:45	/ /	:
319	L	W		0	0		ALL		07/27/90	:	/ /	:
319	R	W		0	0		ALL		07/27/90	:	/ /	:
319	S	W		0	0		ALL		07/27/90	:	/ /	:
320	F	W	BIG RIVER MINE TAILINGS - TRIP BLANK	1	1	DESLOGE	MISSOURI		07/27/90	14:00	/ /	:
321	F	W	BIG RIVER MINE TAILINGS - FIELD BLANK	1	2	DESLOGE	MISSOURI		07/27/90	14:05	/ /	:
322	F	W	BIG RIVER MINE TAILINGS - FIELD BLANK	1	2	DESLOGE	MISSOURI		07/27/90	14:10	/ /	:
323	F	W	BIG RIVER MINE TAILINGS - RINSATE	1	2	DESLOGE	MISSOURI		07/27/90	14:15	/ /	:
324		W	BIG RIVER MINE TAILINGS(GROUND WATER)	1	4	DESLOGE	MISSOURI		07/24/90	07:30	/ /	:
324	F	W	BIG RIVER MINE TAILINGS - RINSATE	1	2	DESLOGE	MISSOURI		07/27/90	14:30	/ /	:
325	F	W	BIG RIVER MINE TAILINGS - ACID BLANK	0	0	DESLOGE	MISSOURI		07/27/90	15:30	/ /	:
400		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/23/90	12:47	07/24/90	01:00

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	# CONT.	CITY	STATE	STORET/ SAROAD LOC NO	BEG. DATE	BEG. TIME	END. DATE	END. TIME
402		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/23/90	12:47	07/24/90	01:00
403		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/23/90	12:00	07/23/90	23:40
403	L	A		0	0		ALL		/ /	:	/ /	:
404		A	BIG RIVER MINE TAILINGS	0	0	DESLOGE	MISSOURI		07/23/90	12:00	07/23/90	24:00
406		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/23/90	11:50	07/24/90	11:50
407		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/23/90	12:00	07/23/90	24:00
408		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/23/90	12:00	07/23/90	24:00
408	L	A		0	0		ALL		/ /	:	/ /	:
409		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:00	07/24/90	24:00
410		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:00	07/24/90	23:50
411		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:00	07/24/90	23:30
412		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:00	07/25/90	00:15
413		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:00	07/25/90	00:30
414		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	11:45	07/24/90	23:45
415		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:05	07/24/90	23:50
416		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/24/90	12:00	07/24/90	24:00
417		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/25/90	24:00
418		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/25/90	24:00
419		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/25/90	23:30
420		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/26/90	09:00
421		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	11:30	07/25/90	24:00
422		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/25/90	24:00
422	L	A		0	0		ALL		/ /	:	/ /	:
423		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/26/90	00:15
424		A		0	0		ALL		/ /	:	/ /	:
424	F	A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/25/90	12:00	07/25/90	24:00
425		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	11:30	07/27/90	00:50
426		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	11:30	07/27/90	00:06
427		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	12:00	07/26/90	23:21
428		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	12:00	07/26/90	24:00
429		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	12:00	07/26/90	23:15
430		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	12:00	07/27/90	00:26
431		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	12:00	07/26/90	23:55
432		A		0	0		ALL		/ /	:	/ /	:
432	F	A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/26/90	12:00	07/26/90	24:00
433		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/27/90	23:59
433	L	A		0	0		ALL		/ /	:	/ /	:
434		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/27/90	23:41
435		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/27/90	23:42
436		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/28/90	00:11
437		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	11:45	07/28/90	01:00
438		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/28/90	00:24
439		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/28/90	00:27
440		A		0	0		ALL		/ /	:	/ /	:
440	F	A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/27/90	12:00	07/27/90	24:00
441		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	12:00	07/28/90	23:56
442		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	12:00	07/28/90	23:39
443		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	13:55	07/29/90	03:00
444		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	12:00	07/28/90	23:47
445		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	11:39	07/29/90	00:30
446		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	11:45	07/28/90	21:15
448		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	12:00	07/28/90	23:30
449		A	BIG RIVER MINE TAILINGS	1	1	DESLOGE	MISSOURI		07/28/90	12:00	07/28/90	24:00
900	M	A		0	0		ALL		/ /	:	/ /	:

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	# CONT.	CITY	STATE	STORET/ SAROAD LOC NO	BEG. DATE	BEG. TIME	END. DATE	END. TIME
901	R	A		0	0		ALL		/ /	:	/ /	:
901	S	A		0	0		ALL		/ /	:	/ /	:
902	A	A		0	0		ALL		/ /	:	/ /	:
902	C	A		0	0		ALL		/ /	:	/ /	:
903	M	A		0	0		ALL		/ /	:	/ /	:
904	R	A		0	0		ALL		/ /	:	/ /	:
904	S	A		0	0		ALL		/ /	:	/ /	:
905	A	A		0	0		ALL		/ /	:	/ /	:
905	C	A		0	0		ALL		/ /	:	/ /	:
906	M	A		0	0		ALL		/ /	:	/ /	:
907	A	A		0	0		ALL		/ /	:	/ /	:
907	C	A		0	0		ALL		/ /	:	/ /	:
908	M	W		0	0		ALL		/ /	:	/ /	:
909	A	W		0	0		ALL		/ /	:	/ /	:
909	C	W		0	0		ALL		/ /	:	/ /	:
910	M	W		0	0		ALL		/ /	:	/ /	:
911	A	W		0	0		ALL		/ /	:	/ /	:
911	C	W		0	0		ALL		/ /	:	/ /	:
912	M	W		0	0		ALL		/ /	:	/ /	:
913	A	W		0	0		ALL		/ /	:	/ /	:
913	C	W		0	0		ALL		/ /	:	/ /	:
914	A	S		0	0		ALL		/ /	:	/ /	:
914	C	S		0	0		ALL		/ /	:	/ /	:
914	M	S		0	0		ALL		/ /	:	/ /	:
915	A	W		0	0		ALL		/ /	:	/ /	:
915	C	W		0	0		ALL		/ /	:	/ /	:
915	M	W		0	0		ALL		/ /	:	/ /	:
916	A	W		0	0		ALL		/ /	:	/ /	:
916	C	W		0	0		ALL		/ /	:	/ /	:
916	M	W		0	0		ALL		/ /	:	/ /	:
917	M	S		0	0		ALL		/ /	:	/ /	:
918	A	S		0	0		ALL		/ /	:	/ /	:
918	C	S		0	0		ALL		/ /	:	/ /	:
919	A	S		0	0		ALL		/ /	:	/ /	:
919	C	S		0	0		ALL		/ /	:	/ /	:
920	M	S		0	0		ALL		/ /	:	/ /	:

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

	COMPOUND	UNITS	001		001L		001R		001S		002		003	
SM01 SILVER	BY ICAP	MG/KG	2.3	U	2.3	U	12		14		3.0	U	2.6	U
SM02 ALUMINUM	BY ICAP	MG/KG	11000		10000		N/A	O	N/A	O	630		600	
SM03 ARSENIC	BY ICAP	MG/KG	6.3		5.6		9.3		15		14		7.7	
SM04 BARIUM	BY ICAP	MG/KG	150	J	260		470		930		42	U	41	U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.2	U	1.2	U	12		12		1.1	U	1.0	U
SM06 CADMIUM	BY ICAP	MG/KG	1.2	U	1.2	U	12		13		21		14	
SM07 COBALT	BY ICAP	MG/KG	14		23		120		140		13		11	
SM08 CHROMIUM	BY ICAP	MG/KG	13	J	18		47		57		2.1	U	2.0	U
SM09 COPPER	BY ICAP	MG/KG	14		11		58		67		71		60	
SM10 IRON	BY ICAP	MG/KG	13000		15000		N/A	O	N/A	O	30000		32000	
SM11 MANGANESE	BY ICAP	MG/KG	2000	J	3500		120		5400		4200	J	4400	J
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	9.4	U	9.4		120		130		18	J	15	J
SM14 LEAD	BY ICAP	MG/KG	130	J	130		120		320		1000	J	1100	J
SM15 ANTIMONY	BY ICAP	MG/KG	14	U	14	U	120		66		13	U	12	U
SM16 SELENIUM	BY ICAP	MG/KG	1.2	U	1.2	U	2.3		2.3		2.0	U	4.8	J
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.3	U	2.3	U	9.4		9.6		2.1	U	2.0	U
SM19 VANADIUM	BY ICAP	MG/KG	27		31		120		140		11	U	10	U
SM20 ZINC	BY ICAP	MG/KG	65		66		120		190		950		570	
SM21 CALCIUM	BY ICAP	MG/KG	3300		3900		N/A	O	N/A	O	180000		180000	
SM22 MAGNESIUM	BY ICAP	MG/KG	2200		2200		N/A	O	N/A	O	97000		100000	
SM23 SODIUM	BY ICAP	MG/KG	1200	U	1200	U	N/A	O	N/A	O	1100	U	1000	U
SM24 POTASSIUM	BY ICAP	MG/KG	1300		1200	U	N/A	O	N/A	O	1100	U	1000	U
ZZ01 SAMPLE NUMBER		NA	001		001		001		001		002		003	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	004		005		006		007		008		009	
SM01 SILVER	BY ICAP	MG/KG	2.9	U	2.2	U	2.6	U	3.2	U	3.2	U	2.2	U
SM02 ALUMINUM	BY ICAP	MG/KG	700		640		1000		670		640		580	
SM03 ARSENIC	BY ICAP	MG/KG	8.1		8.6		9.6		9.4		2.1	U	9.7	
SM04 BARIUM	BY ICAP	MG/KG	42	U	43	U	47	U	42	U	42	U	44	U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.2		1.1	U	1.2	U	1.0	U	1.1	U	1.1	U
SM06 CADMIUM	BY ICAP	MG/KG	20		8.4		19		28		30		13	
SM07 COBALT	BY ICAP	MG/KG	11	U	14		27		15		13		12	
SM08 CHROMIUM	BY ICAP	MG/KG	2.1	U	2.2	U	2.4	U	2.1	U	2.1	U	2.2	U
SM09 COPPER	BY ICAP	MG/KG	67		65		60		120		88		58	
SM10 IRON	BY ICAP	MG/KG	31000		29000		32000		31000		31000		31000	
SM11 MANGANESE	BY ICAP	MG/KG	4300	J	4100	J	4400	J	4300	J	4200	J	4200	J
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	8.5	U	15	J	20	J	12	J	14	J	16	J
SM14 LEAD	BY ICAP	MG/KG	1400	J	930	J	1500	J	1700	J	1600	J	1300	J
SM15 ANTIMONY	BY ICAP	MG/KG	13	U	13	U	14	U	15	J	13	U	13	U
SM16 SELENIUM	BY ICAP	MG/KG	3.9	J	1.1	U	4.9	J	1.0	U	1.1	U	1.4	
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.1	U	2.2	U	2.4	U	2.1	U	2.1	U	2.2	U
SM19 VANADIUM	BY ICAP	MG/KG	11	U	11	U	12	U	10	U	11	U	11	U
SM20 ZINC	BY ICAP	MG/KG	840		370		870		1200		1300		610	
SM21 CALCIUM	BY ICAP	MG/KG	170000		170000		180000		180000		180000		180000	
SM22 MAGNESIUM	BY ICAP	MG/KG	94000		93000		98000		99000		97000		99000	
SM23 SODIUM	BY ICAP	MG/KG	1100	U	1100	U	1200	U	1000	U	1100	U	1100	U
SM24 POTASSIUM	BY ICAP	MG/KG	1100	U	1100	U	1200	U	1000	U	1100	U	1100	U
ZZ01 SAMPLE NUMBER		NA	004		005		006		007		008		009	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	010	011	012	013	014	015
SM01 SILVER	BY ICAP	MG/KG	7.7	2.6 U	2.6 U	2.4 U	2.6 U	2.4 U
SM02 ALUMINUM	BY ICAP	MG/KG	2900	550	7300	9100	8800	11000
SM03 ARSENIC	BY ICAP	MG/KG	14	6.5	9.3	6.9	6.2	8.2
SM04 BARIUM	BY ICAP	MG/KG	48 U	41 U	290 J	120 J	300 J	150 J
SM05 BERYLLIUM	BY ICAP	MG/KG	2.7	1.0 U	1.3 U	1.2 U	1.3 U	1.2 U
SM06 CADMIUM	BY ICAP	MG/KG	79	24	1.3 U	1.2 U	1.3 U	3.2
SM07 COBALT	BY ICAP	MG/KG	42	10 U	16	15	16	16
SM08 CHROMIUM	BY ICAP	MG/KG	4.0 U	2.1 U	13 J	14 J	12 J	13 J
SM09 COPPER	BY ICAP	MG/KG	15	60	6.5 U	8.8	11	15
SM10 IRON	BY ICAP	MG/KG	24000	30000	18000	16000	17000	20000
SM11 MANGANESE	BY ICAP	MG/KG	2900 J	4300 J	2700 J	1600 J	3500 J	2300 J
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
SM13 NICKEL	BY ICAP	MG/KG	37 J	9.0 J	10 U	9.6 U	17 J	11 J
SM14 LEAD	BY ICAP	MG/KG	13000 J	970 J	65 J	450 J	85 J	370 J
SM15 ANTIMONY	BY ICAP	MG/KG	14 U	12 U	16 U	14 U	15 U	15 U
SM16 SELENIUM	BY ICAP	MG/KG	1.2 U	1.0 U	1.3 U	1.8 J	2.6 J	2.5 J
SM17 TITANIUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
SM18 THALLIUM	BY ICAP	MG/KG	2.4 U	2.1 U	2.6 U	2.4 U	2.6 U	2.4 U
SM19 VANADIUM	BY ICAP	MG/KG	12 U	10 U	34	26	26	34
SM20 ZINC	BY ICAP	MG/KG	4300	1200	35	42	57	180
SM21 CALCIUM	BY ICAP	MG/KG	140000	180000	1300 U	2000	2100	22000
SM22 MAGNESIUM	BY ICAP	MG/KG	76000	100000	1300 U	1500	1300 U	12000
SM23 SODIUM	BY ICAP	MG/KG	1200 U	1000 U	1300 U	1200 U	1300 U	1200 U
SM24 POTASSIUM	BY ICAP	MG/KG	2300	1000 U	1300 U	1200 U	1300 U	1200 U
ZZ01 SAMPLE NUMBER		NA	010	011	012	013	014	015
ZZ02 ACTIVITY CODE		NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	016		017		018		019		020		021	
SM01 SILVER	BY ICAP	MG/KG	2.6	U	2.4	U	2.3	U	2.3	U	2.4	U	2.3	U
SM02 ALUMINUM	BY ICAP	MG/KG	8200		8200		8900		9000		9400		960	
SM03 ARSENIC	BY ICAP	MG/KG	13		9.5		7.2		6.8		6.2		2.3	U
SM04 BARIUM	BY ICAP	MG/KG	240	J	530	J	140	J	140	J	180	J	46	U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.3	U	1.2	U	1.2	U	1.1	U	1.2	U	1.2	U
SM06 CADMIUM	BY ICAP	MG/KG	6.0		1.2	U	4.8		5.3		1.2	U	16	
SM07 COBALT	BY ICAP	MG/KG	13	U	14		16		18		12	U	19	
SM08 CHROMIUM	BY ICAP	MG/KG	23	J	15	J	13	J	13	J	14	J	4.1	U
SM09 COPPER	BY ICAP	MG/KG	29		8.7		30		31		8.8		95	J
SM10 IRON	BY ICAP	MG/KG	22000		16000		16000		17000		15000		32000	
SM11 MANGANESE	BY ICAP	MG/KG	590	J	970	J	1200	J	1200	J	970	J	4400	
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	10	U	9.5	U	12	J	12	J	9.4	U	20	
SM14 LEAD	BY ICAP	MG/KG	940	J	64	J	1500	J	1600	J	76	J	1500	
SM15 ANTIMONY	BY ICAP	MG/KG	16	U	14	U	14	U	14	U	14	U	17	U
SM16 SELENIUM	BY ICAP	MG/KG	2.0	J	1.2	U	1.2	U	1.1	U	2.1	J	1.2	U
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.6	U	2.4	U	2.3	U	2.3	U	2.4	U	2.3	U
SM19 VANADIUM	BY ICAP	MG/KG	22		31		25		25		26		12	U
SM20 ZINC	BY ICAP	MG/KG	490		66		370		390		67		760	J
SM21 CALCIUM	BY ICAP	MG/KG	13000		3300		14000		14000		2800		180000	
SM22 MAGNESIUM	BY ICAP	MG/KG	3900		2300		7400		7500		1700		95000	
SM23 SODIUM	BY ICAP	MG/KG	1300	U	1200	U	1200	U	1100	U	1200	U	1200	U
SM24 POTASSIUM	BY ICAP	MG/KG	1300	U	1200	U	1200	U	1100	U	1200	U	1200	U
ZZ01 SAMPLE NUMBER		NA	016		017		018		019		020		021	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	022		023		024		025		026		027	
SM01 SILVER	BY ICAP	MG/KG	19		2.1	U	2.3	U	3.1	U	3.2		3.3	
SM02 ALUMINUM	BY ICAP	MG/KG	9200		9100		5500		7100		6000		860	
SM03 ARSENIC	BY ICAP	MG/KG	2.2	U	2.1	U	2.3	U	3.1	U	2.3	U	2.4	U
SM04 BARIUM	BY ICAP	MG/KG	94		170		140		180		99		48	U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.1	U	1.1	U	1.2	U	1.5	U	1.1	U	1.2	U
SM06 CADMIUM	BY ICAP	MG/KG	270		2.1		1.2	U	1.6		25		11	
SM07 COBALT	BY ICAP	MG/KG	16		12		12	U	18		13		38	
SM08 CHROMIUM	BY ICAP	MG/KG	15		13		9.6		16		8.7		3.2	U
SM09 COPPER	BY ICAP	MG/KG	21	J	17	J	8.9	J	7.7	U	12	J	550	J
SM10 IRON	BY ICAP	MG/KG	19000		16000		11000		14000		14000		45000	
SM11 MANGANESE	BY ICAP	MG/KG	1400		1800		290		2100		1700		5400	
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	8.8	U	15		9.2	U	12	U	9.6		36	
SM14 LEAD	BY ICAP	MG/KG	650		190		99		130		1300		2500	
SM15 ANTIMONY	BY ICAP	MG/KG	13	U	13	U	14	U	18	U	14	U	15	U
SM16 SELENIUM	BY ICAP	MG/KG	1.1	U	1.1	U	1.2	U	1.5	U	1.1	U	1.2	U
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.2	U	2.1	U	2.3	U	3.1	U	2.3	U	2.4	U
SM19 VANADIUM	BY ICAP	MG/KG	26		25		18		30		20		12	U
SM20 ZINC	BY ICAP	MG/KG	13000	J	140	J	98	J	53	J	1100	J	630	J
SM21 CALCIUM	BY ICAP	MG/KG	29000		5600		4100		5300		34000		210000	
SM22 MAGNESIUM	BY ICAP	MG/KG	15000		3000		2200		3200		18000		110000	
SM23 SODIUM	BY ICAP	MG/KG	1100	U	1100	U	1200	U	1500	U	1100	U	1200	U
SM24 POTASSIUM	BY ICAP	MG/KG	1100	U	1100		1200	U	1500	U	1100	U	1200	U
ZZ01 SAMPLE NUMBER		NA	022		023		024		025		026		027	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	027L		027R		027S		028		029		030	
SM01 SILVER	BY ICAP	MG/KG	2.4	U	12		16		2.1	U	2.3	U	2.3	U
SM02 ALUMINUM	BY ICAP	MG/KG	910		N/A	O	N/A	O	590		750		9600	
SM03 ARSENIC	BY ICAP	MG/KG	11	J	9.7		22	J	2.1	U	7.0	J	7.6	J
SM04 BARIUM	BY ICAP	MG/KG	48	U	480		460		42	U	46	U	240	
SM05 BERYLLIUM	BY ICAP	MG/KG	1.2	U	12		11		1.0	U	1.1	U	1.1	U
SM06 CADMIUM	BY ICAP	MG/KG	9.9		12		23		10		11		7.9	
SM07 COBALT	BY ICAP	MG/KG	37		120		140		10	U	11	U	23	
SM08 CHROMIUM	BY ICAP	MG/KG	2.4	U	49		44		2.7	U	3.5	U	14	
SM09 COPPER	BY ICAP	MG/KG	530	J	61		420	J	8.1	J	5.7	U	28	J
SM10 IRON	BY ICAP	MG/KG	44000		N/A	O	N/A	O	25000		26000		19000	
SM11 MANGANESE	BY ICAP	MG/KG	5300		120		5400		3700		3700		3100	
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	39		120		140		9.5		9.1	U	21	
SM14 LEAD	BY ICAP	MG/KG	2300		120		2300		1600		910		2200	
SM15 ANTIMONY	BY ICAP	MG/KG	21	U	120		110		12	U	14	U	14	U
SM16 SELENIUM	BY ICAP	MG/KG	7.3	U	2.4		2.7		1.0	U	1.1	U	1.1	U
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.4	U	12		12		2.1	U	2.3	U	2.3	U
SM19 VANADIUM	BY ICAP	MG/KG	12	U	120		120		10	U	11	U	30	
SM20 ZINC	BY ICAP	MG/KG	520	J	120		670	J	510	J	510	J	430	J
SM21 CALCIUM	BY ICAP	MG/KG	200000		N/A	O	N/A	O	150000		170000		8600	
SM22 MAGNESIUM	BY ICAP	MG/KG	170000		N/A	O	N/A	O	81000		90000		4500	
SM23 SODIUM	BY ICAP	MG/KG	1200	U	N/A	O	N/A	O	1000	U	1100	U	1100	U
SM24 POTASSIUM	BY ICAP	MG/KG	1200	U	N/A	O	N/A	O	1000	U	1100	U	1200	
ZZ01 SAMPLE NUMBER		NA	027		027		027		028		029		030	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	120	200		201		202		203		204	
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L		200	U	200	U	200	U	200	U	200	U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM38 BARIUM,DISSOLVED BY ICAP	UG/L		200	U	200	U	200	U	200	U	200	U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM41 COBALT,DISSOLVED BY ICAP	UG/L		50	U	50	U	50	U	50	U	50	U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM43 COPPER,DISSOLVED BY ICAP	UG/L		25	U	25	U	25	U	25	U	25	U
WM44 IRON,DISSOLVED BY ICAP	UG/L		100	U	100	U	100	U	100	U	100	U
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L		15	U	20		210		21		35	
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L		N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L		40	U	40	U	40	U	40	U	40	U
WM48 LEAD,DISSOLVED BY ICAP	UG/L		3.0	U	3.0	U	23		3.0	U	3.3	U
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L		60	U	60	U	60	U	60	U	60	U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L		N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L		50	U	50	U	50	U	50	U	50	U
WM54 ZINC,DISSOLVED BY ICAP	UG/L		20	U	20	U	1200		20	U	44	
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L		32		31		130		35		43	
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L		19		18		53		19		24	
WM57 SODIUM,DISSOLVED BY ICAP	MG/L		5.0	U	5.0	U	5.6		5.0	U	5.0	U
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
ZZ01 SAMPLE NUMBER	NA	120	200		201		202		203		204	
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	205		206		207		208		208L	208R
WF01 WATER TEMP	'C	23		25		28		29			
WF05 PH. FIELD	SU	7.63		7.42		7.33		7.44			
WF10 CONDUCTIVITY (FIELD)	UMHOS	280		260		380		360			
WM01 SILVER BY ICAP	UG/L	10	U	10	U	10	U	10	U		
WM02 ALUMINUM BY ICAP	UG/L	220	U	240	U	200	U	240	U		
WM03 ARSENIC BY ICAP	UG/L	10	U	10	U	10	U	10	U		
WM04 BARIUM BY ICAP	UG/L	200	U	200	U	200	U	200	U		
WM05 BERYLLIUM BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U		
WM06 CADMIUM BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U		
WM07 COBALT BY ICAP	UG/L	50	U	50	U	50	U	50	U		
WM08 CHROMIUM BY ICAP	UG/L	10	U	10	U	10	U	10	U		
WM09 COPPER BY ICAP	UG/L	25	U	25	U	25	U	25	U		
WM10 IRON BY ICAP	UG/L	330		340		270		310			
WM11 MANGANESE BY ICAP	UG/L	78		74		75		67			
WM12 MOLYBDENUM BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O		
WM13 NICKEL BY ICAP	UG/L	40	U	40	U	40	U	40	U		
WM14 LEAD BY ICAP	UG/L	29		32		34		33			
WM15 ANTIMONY BY ICAP	UG/L	60	U	60	U	60	U	60	U		
WM16 SELENIUM BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U		
WM17 TITANIUM BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O		
WM18 THALLIUM BY ICAP	UG/L	10	U	10	U	10	U	10	U		
WM19 VANADIUM BY ICAP	UG/L	50	U	50	U	50	U	50	U		
WM20 ZINC BY ICAP	UG/L	74		84		100		98			
WM21 CALCIUM, TOTAL BY ICAP	MG/L	41		42		42		42			
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	23		24		24		23			
WM23 SODIUM, TOTAL BY ICAP	MG/L	5.0	U	5.0	U	5.0	U	5.0	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	120	200	201	202	203	204
WF10 CONDUCTIVITY (FIELD)	UMHOS		170	170	550	200	290
WM01 SILVER BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM02 ALUMINUM BY ICAP	UG/L		200 U	280 U	200 U	380 U	350 U
WM03 ARSENIC BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM04 BARIUM BY ICAP	UG/L		200 U	200 U	200 U	200 U	200 U
WM05 BERYLLIUM BY ICAP	UG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM06 CADMIUM BY ICAP	UG/L		5.0 U	5.0 U	5.2 U	5.0 U	5.0 U
WM07 COBALT BY ICAP	UG/L		50 U	50 U	50 U	50 U	50 U
WM08 CHROMIUM BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM09 COPPER BY ICAP	UG/L		25 U	25 U	25 U	25 U	25 U
WM10 IRON BY ICAP	UG/L		260	360	280	550	530
WM11 MANGANESE BY ICAP	UG/L		59	54	300	75	89
WM12 MOLYBDENUM BY ICAP	UG/L		N/A O	N/A O	N/A O	N/A O	N/A O
WM13 NICKEL BY ICAP	UG/L		40 U	40 U	40 U	40 U	40 U
WM14 LEAD BY ICAP	UG/L		3.0 U	3.0 U	61	15	37
WM15 ANTIMONY BY ICAP	UG/L		60 U	60 U	60 U	60 U	60 U
WM16 SELENIUM BY ICAP	UG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM17 TITANIUM BY ICAP	UG/L		N/A O	N/A O	N/A O	N/A O	N/A O
WM18 THALLIUM BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM19 VANADIUM BY ICAP	UG/L		50 U	50 U	50 U	50 U	50 U
WM20 ZINC BY ICAP	UG/L		20 U	74	1300	44	81
WM21 CALCIUM, TOTAL BY ICAP	MG/L		31	30	130	33	41
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L		18	18	51	18	23
WM23 SODIUM, TOTAL BY ICAP	MG/L		5.0 U	5.0 U	5.3	5.0 U	5.0 U
WM24 POTASSIUM, TOTAL BY ICAP	MG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM35 SILVER,DISSOLVED BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	106	107	108	109	110	111
SM01 SILVER	BY ICAP	MG/KG	3.1	6.8	4.4	2.9	4.6 J	2.1 U
SM02 ALUMINUM	BY ICAP	MG/KG	1300	1200	940	1500	3260	6800
SM03 ARSENIC	BY ICAP	MG/KG	8.3 J	9.0 J	2.2 U	6.4 J	5.5	6.7
SM04 BARIUM	BY ICAP	MG/KG	46 U	48 U	44 U	46 U	49 J	99 J
SM05 BERYLLIUM	BY ICAP	MG/KG	1.2 U	1.2 U	1.1 U	1.2 U	1.0 U	1.0 U
SM06 CADMIUM	BY ICAP	MG/KG	42	88	59	24	32	6.3
SM07 COBALT	BY ICAP	MG/KG	12 U	12 U	11 U	12 U	52	10 U
SM08 CHROMIUM	BY ICAP	MG/KG	5.9 U	5.7 U	4.7 U	7.2	5.7	9.9
SM09 COPPER	BY ICAP	MG/KG	17 J	6.0 U	5.5 U	18 J	10 U	13
SM10 IRON	BY ICAP	MG/KG	18000	23000	21000	17000	16000	12000
SM11 MANGANESE	BY ICAP	MG/KG	2500	3300	3200	2700	3100 J	680 J
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
SM13 NICKEL	BY ICAP	MG/KG	9.3 U	12	9.6	13	59	13
SM14 LEAD	BY ICAP	MG/KG	1600	3600	1300	1300	540	350
SM15 ANTIMONY	BY ICAP	MG/KG	14 U	14 U	15 U	15 U	12 U	12 U
SM16 SELENIUM	BY ICAP	MG/KG	1.2 U	1.2 U	1.1 U	1.2 U	1.5	1.0 U
SM17 TITANIUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
SM18 THALLIUM	BY ICAP	MG/KG	2.3 U	2.4 U	2.2 U	2.3 U	2.1 U	2.1 U
SM19 VANADIUM	BY ICAP	MG/KG	12 U	12 U	11 U	12 U	12	18
SM20 ZINC	BY ICAP	MG/KG	2200 J	4500 J	2600 J	1100 J	1900	400
SM21 CALCIUM	BY ICAP	MG/KG	130000	160000	150000	130000	85000	15000
SM22 MAGNESIUM	BY ICAP	MG/KG	68000	92000	86000	70000	43000	7800
SM23 SODIUM	BY ICAP	MG/KG	1200 U	1200 U	1100 U	1200 U	1000 U	1000 U
SM24 POTASSIUM	BY ICAP	MG/KG	1200 U	1200 U	1100 U	1200 U	1000 U	1000 U
ZZ01 SAMPLE NUMBER		NA	106	107	108	109	110	111
ZZ02 ACTIVITY CODE		NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	100		101		102		103		104		105	
SM01 SILVER	BY ICAP	MG/KG	2.2	U	2.3	U	11		2.6	U	12		2.2	U
SM02 ALUMINUM	BY ICAP	MG/KG	2800		2400		1300		1900		1200		1300	
SM03 ARSENIC	BY ICAP	MG/KG	4.4	J	5.5	J	2.5	U	30	J	2.2	U	6.2	J
SM04 BARIUM	BY ICAP	MG/KG	45	U	49		49	U	56		44	U	45	U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.1	U	1.1	U	1.2	U	1.3	U	1.1	U	1.1	U
SM06 CADMIUM	BY ICAP	MG/KG	1.1	U	1.1	U	140		46		130		21	
SM07 COBALT	BY ICAP	MG/KG	11	U	11	U	12	U	13	U	11	U	11	U
SM08 CHROMIUM	BY ICAP	MG/KG	11		16		3.7	U	13		5.2	U	6.2	U
SM09 COPPER	BY ICAP	MG/KG	5.6	U	5.7	U	12	J	6.6	U	6.7	J	35	J
SM10 IRON	BY ICAP	MG/KG	7400		12000		22000		17000		25000		22000	
SM11 MANGANESE	BY ICAP	MG/KG	400		480		3600		1300		3400		3000	
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	9.0	U	9.1	U	9.8	U	10	U	8.9	U	10	
SM14 LEAD	BY ICAP	MG/KG	1.1	U	1.4		10000		720		5500		1700	
SM15 ANTIMONY	BY ICAP	MG/KG	13	U	14	U	15	U	16	U	13	U	13	U
SM16 SELENIUM	BY ICAP	MG/KG	1.1	U	1.1	U	1.2	U	1.3	U	1.1	U	1.1	U
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.2	U	2.3	U	2.5	U	2.6	U	2.2	U	2.2	U
SM19 VANADIUM	BY ICAP	MG/KG	13		20		12	U	21		11	U	11	U
SM20 ZINC	BY ICAP	MG/KG	21	J	53	J	6500	J	1900	J	6600	J	840	J
SM21 CALCIUM	BY ICAP	MG/KG	3500		2300		190000		36000		140000		130000	
SM22 MAGNESIUM	BY ICAP	MG/KG	2100		1100	U	110000		20000		79000		72000	
SM23 SODIUM	BY ICAP	MG/KG	1100	U	1100	U	1200	U	1300	U	1100	U	1100	U
SM24 POTASSIUM	BY ICAP	MG/KG	1100	U	1100	U	1200	U	1300	U	1100	U	1100	U
ZZ01 SAMPLE NUMBER		NA	100		101		102		103		104		105	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	205		206		207		208		208L		208R	
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	5.0	U	5.0	U	5.0	U	5.0	U				
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	50	
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	200	U	200	U	200	U	2000	
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	40	
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	200	U	200	U	200	U	2000	
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	50	
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	50	
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50	U	50	U	50	U	50	U	50	U	500	
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	200	
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25	U	25	U	25	U	25	U	25	U	250	
WM44 IRON,DISSOLVED BY ICAP	UG/L	1900		100	U	100	U	100	U	100	U	1000	
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	50		38		38		35		37		500	
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	40	U	40	U	40	U	40	U	40	U	500	
WM48 LEAD,DISSOLVED BY ICAP	UG/L	3.0	U	3.0	U	3.9	U	4.0		3.7		20	
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60	U	60	U	60	U	60	U	60	U	500	
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	50	
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50	U	50	U	50	U	50	U	50	U	500	
WM54 ZINC,DISSOLVED BY ICAP	UG/L	41		56		68		68		69		500	
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	43		43		43		45		45		N/A	O
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	24		24		24		25		25		N/A	O
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	N/A	O
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	N/A	O
ZZ01 SAMPLE NUMBER	NA	205		206		207		208		208		208	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	208S	209	210	211	212	212D
WF01 WATER TEMP		'C		19	18.5	26	25	
WF05 PH, FIELD		SU		7.45	7.33	7.60	7.29	
WF10 CONDUCTIVITY (FIELD)		UMHOS		370	550	245	290	
WM01 SILVER	BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM02 ALUMINUM	BY ICAP	UG/L		250 U	200 U	250 U	200 U	200 U
WM03 ARSENIC	BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM04 BARIUM	BY ICAP	UG/L		200 U	200 U	200 U	200 U	200 U
WM05 BERYLLIUM	BY ICAP	UG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM06 CADMIUM	BY ICAP	UG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM07 COBALT	BY ICAP	UG/L		50 U	50 U	50 U	50 U	50 U
WM08 CHROMIUM	BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM09 COPPER	BY ICAP	UG/L		25 U	25 U	25 U	25 U	25 U
WM10 IRON	BY ICAP	UG/L		320	240	320	260	100 U
WM11 MANGANESE	BY ICAP	UG/L		62	280	81	57	60
WM12 MOLYBDENUM	BY ICAP	UG/L		N/A O	N/A O	N/A O	N/A O	N/A O
WM13 NICKEL	BY ICAP	UG/L		40 U	40 U	40 U	40 U	40 U
WM14 LEAD	BY ICAP	UG/L		31	6.0	26	29	28
WM15 ANTIMONY	BY ICAP	UG/L		60 U	60 U	60 U	60 U	60 U
WM16 SELENIUM	BY ICAP	UG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM17 TITANIUM	BY ICAP	UG/L		N/A O	N/A O	N/A O	N/A O	N/A O
WM18 THALLIUM	BY ICAP	UG/L		10 U	10 U	10 U	10 U	10 U
WM19 VANADIUM	BY ICAP	UG/L		50 U	50 U	50 U	50 U	50 U
WM20 ZINC	BY ICAP	UG/L		98	42	62	120	130 U
WM21 CALCIUM, TOTAL BY ICAP		MG/L		42	92	40	43	46
WM22 MAGNESIUM, TOTAL BY ICAP		MG/L		24	53	23	24	26
WM23 SODIUM, TOTAL BY ICAP		MG/L		5.0 U	8.9	5.0 U	5.0 U	5.0 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	205	206	207	208	208L	208R
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	208S	209	210	211	212	212D
WM24 POTASSIUM, TOTAL BY ICAP	MG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM35 SILVER,DISSOLVED BY ICAP	UG/L	55	10 U	10 U	10 U	10 U	10 U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	2000	200 U	200 U	200 U	200 U	200 U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	44	10 U	10 U	10 U	10 U	10 U
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	2100	200 U	200 U	200 U	200 U	200 U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	47	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	58	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM41 COBALT,DISSOLVED BY ICAP	UG/L	510	50 U	50 U	50 U	50 U	50 U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	230	10 U	10 U	10 U	10 U	10 U
WM43 COPPER,DISSOLVED BY ICAP	UG/L	250	25 U	25 U	25 U	25 U	25 U
WM44 IRON,DISSOLVED BY ICAP	UG/L	1200	100 U	100 U	100 U	100 U	100 U
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	560	39	230	58	36	35
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	550	40 U	40 U	40 U	40 U	40 U
WM48 LEAD,DISSOLVED BY ICAP	UG/L	20	4.5	3.0 U	3.0 U	4.4	4.8
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	510	60 U	60 U	60 U	60 U	60 U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	10	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	56	10 U	10 U	10 U	10 U	10 U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	510	50 U	50 U	50 U	50 U	50 U
WM54 ZINC,DISSOLVED BY ICAP	UG/L	570	86	20 U	34 U	100	99
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	N/A O	47	98	43	46	43
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	N/A O	27	57	24	26	24
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	N/A O	5.0 U	9.7	5.0 U	5.0 U	5.0 U
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	N/A O	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
ZZ01 SAMPLE NUMBER	NA	208	209	210	211	212	212

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	208S	209	210	211	212	212D
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	213	214	215	215L	215R	215S
WF01 WATER TEMP	'C	26	23	23			
WF05 PH, FIELD	SU	7.55	7.31	8.0			
WF10 CONDUCTIVITY (FIELD)	UMHOS	290	350	550			
WM01 SILVER BY ICAP	UG/L	10 U	10 U	10 U	10 U	50	57
WM02 ALUMINUM BY ICAP	UG/L	220 U	200 U	200 U	200 U	2000	2100
WM03 ARSENIC BY ICAP	UG/L	10 U	10 U	10 U	10 U	40	40
WM04 BARIUM BY ICAP	UG/L	200 U	200 U	200 U	200 U	2000	2000
WM05 BERYLLIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	50	49
WM06 CADMIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	50	54
WM07 COBALT BY ICAP	UG/L	50 U	50 U	50 U	50 U	500	480
WM08 CHROMIUM BY ICAP	UG/L	10 U	10 U	10 U	10 U	200	190
WM09 COPPER BY ICAP	UG/L	25 U	25 U	25 U	25 U	250	240
WM10 IRON BY ICAP	UG/L	260	18	100 U	170	1000	1100
WM11 MANGANESE BY ICAP	UG/L	56	50	20	50	500	530
WM12 MOLYBDENUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM13 NICKEL BY ICAP	UG/L	40 U	40 U	40 U	40 U	500	520
WM14 LEAD BY ICAP	UG/L	30	27	32	28	20	48
WM15 ANTIMONY BY ICAP	UG/L	60 U	60 U	60 U	60 U	500	520
WM16 SELENIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	10	8.6
WM17 TITANIUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM18 THALLIUM BY ICAP	UG/L	10 U	10 U	10 U	10 U	50	50
WM19 VANADIUM BY ICAP	UG/L	50 U	50 U	50 U	50 U	500	480
WM20 ZINC BY ICAP	UG/L	130	150	120	150	500	640
WM21 CALCIUM, TOTAL BY ICAP	MG/L	43	48	86	48	N/A O	N/A O
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	24	27	46	27000	N/A O	N/A O
WM23 SODIUM, TOTAL BY ICAP	MG/L	5.0 U	5.0 U	22	5.0 U	N/A O	N/A O

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	213	214	215	215L	215R	215S
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	5.0 U	5.0 U	5.0 U	5.0 U	N/A O	N/A O
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U			
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200 U	200 U	200 U			
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U			
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200 U	200 U	200 U			
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0 U	5.0 U	5.0 U			
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0 U	5.0 U	5.0 U			
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50 U	50 U	50 U			
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U			
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25 U	25 U	25 U			
WM44 IRON,DISSOLVED BY ICAP	UG/L	100 U	100 U	100 U			
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	35	34	15 U			
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O			
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	40 U	40 U	40 U			
WM48 LEAD,DISSOLVED BY ICAP	UG/L	5.4	5.7	16			
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60 U	60 U	60 U			
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0 U	5.0 U	5.0 U			
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O			
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U			
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50 U	50 U	50 U			
WM54 ZINC,DISSOLVED BY ICAP	UG/L	110	130	130			
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	47	50	93			
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	26	28	50			
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	5.0 U	5.0 U	23			
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	5.0 U	5.0 U	5.0 U			
ZZ01 SAMPLE NUMBER	NA	213	214	215	215	215	215

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	112		112D		113		114		115		116	
SM01 SILVER	BY ICAP	MG/KG	4.2	U	13	J	2.5	U	2.9	U	5.6	J	2.3	U
SM02 ALUMINUM	BY ICAP	MG/KG	1600		1800		2000		1800		1300		2000	
SM03 ARSENIC	BY ICAP	MG/KG	11		6.4		18		7.9		21		7.1	
SM04 BARIUM	BY ICAP	MG/KG	50	U	49	U	49	U	46	U	63	J	46	U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.3	U	1.2	U	1.2	U	1.2	U	1.5		1.2	U
SM06 CADMIUM	BY ICAP	MG/KG	63		120		16		28		18		14	
SM07 COBALT	BY ICAP	MG/KG	13	U	12	U	12	U	12	U	16		12	
SM08 CHROMIUM	BY ICAP	MG/KG	7.7		4.4		7.9		18		2.9		6.4	
SM09 COPPER	BY ICAP	MG/KG	6.7	U	7.1	U	6.2	U	6.7	U	25		15	
SM10 IRON	BY ICAP	MG/KG	25000		29000		23000		26000		39000		26000	
SM11 MANGANESE	BY ICAP	MG/KG	3300	J	3300	J	3100	J	3100	J	5500	J	3200	J
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM13 NICKEL	BY ICAP	MG/KG	12		9.8	U	12		11		18		13	
SM14 LEAD	BY ICAP	MG/KG	3100		3400		2500		3800		3500		1200	
SM15 ANTIMONY	BY ICAP	MG/KG	15	U	15	U	15	U	14	U	15	U	14	U
SM16 SELENIUM	BY ICAP	MG/KG	1.3	U	1.2	U	1.2	U	1.2	U	1.3	U	1.2	U
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
SM18 THALLIUM	BY ICAP	MG/KG	2.5	U	2.4	U	2.5	U	2.3	U	2.5	U	2.3	U
SM19 VANADIUM	BY ICAP	MG/KG	15		17		12		17		13	U	16	
SM20 ZINC	BY ICAP	MG/KG	3300		6700		810		1800		970		1000	
SM21 CALCIUM	BY ICAP	MG/KG	160000		150000		160000		150000		180000		140000	
SM22 MAGNESIUM	BY ICAP	MG/KG	87000		86000		87000		88000		100000		76000	
SM23 SODIUM	BY ICAP	MG/KG	1300	U	1200	U	1200	U	1200	U	1300	U	1200	U
SM24 POTASSIUM	BY ICAP	MG/KG	1300	U	1200	U	1200	U	1200	U	1300	U	1200	U
ZZ01 SAMPLE NUMBER		NA	112		112		113		114		115		116	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	117	118	118L	118R	118S	119
SM01 SILVER	BY ICAP	MG/KG	5.1 J	2.1 U	4.5 U	10	13	2.1 U
SM02 ALUMINUM	BY ICAP	MG/KG	700	830	660	N/A O	N/A O	1200
SM03 ARSENIC	BY ICAP	MG/KG	11	2.2 U	2.2 U	8.2	9.0	5.5 J
SM04 BARIUM	BY ICAP	MG/KG	48 U	110 J	41 U	410	640	42 U
SM05 BERYLLIUM	BY ICAP	MG/KG	1.4 U	1.0 U	1.3 U	10	11	1.1 U
SM06 CADMIUM	BY ICAP	MG/KG	37	1.0 U	4.0 U	10	12	6.1
SM07 COBALT	BY ICAP	MG/KG	44	10 U	3.1	100	120	11 U
SM08 CHROMIUM	BY ICAP	MG/KG	2.8	4.4	4.7	41	47	4.7
SM09 COPPER	BY ICAP	MG/KG	320	5.2 U	12 U	51	56	8.2 U
SM10 IRON	BY ICAP	MG/KG	47000	6200	4700	N/A O	N/A O	15000
SM11 MANGANESE	BY ICAP	MG/KG	5300 J	900 J	220	100	1500	1700 J
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
SM13 NICKEL	BY ICAP	MG/KG	58	5.8	8.2 U	100	120	13
SM14 LEAD	BY ICAP	MG/KG	8700	4.4	17 U	100	120	610
SM15 ANTIMONY	BY ICAP	MG/KG	15 U	12 U	12 U	100	98	13 U
SM16 SELENIUM	BY ICAP	MG/KG	7.2	1.0 U	1.0 U	2.1	2.2	1.1 U
SM17 TITANIUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
SM18 THALLIUM	BY ICAP	MG/KG	2.4 U	2.1 U	2.1 U	10	9.4	2.1 U
SM19 VANADIUM	BY ICAP	MG/KG	12 U	10 U	10 U	100	120	11
SM20 ZINC	BY ICAP	MG/KG	1500	7.7 U	14 U	100	120	370
SM21 CALCIUM	BY ICAP	MG/KG	210000	1500	1000 U	N/A O	N/A O	59000
SM22 MAGNESIUM	BY ICAP	MG/KG	110000	1000 U	1000 U	N/A O	N/A O	31000
SM23 SODIUM	BY ICAP	MG/KG	1200 U	1000 U	1000 U	N/A O	N/A O	1100 U
SM24 POTASSIUM	BY ICAP	MG/KG	1200 U	1000 U	1000 U	N/A O	N/A O	1100 U
ZZ01 SAMPLE NUMBER		NA	117	118	118	118	118	119
ZZ02 ACTIVITY CODE		NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	120		200	201	202	203	204
SM01 SILVER	BY ICAP	MG/KG	2.2	U					
SM02 ALUMINUM	BY ICAP	MG/KG	930						
SM03 ARSENIC	BY ICAP	MG/KG	4.5	U					
SM04 BARIUM	BY ICAP	MG/KG	43	U					
SM05 BERYLLIUM	BY ICAP	MG/KG	1.1	U					
SM06 CADMIUM	BY ICAP	MG/KG	3.7	U					
SM07 COBALT	BY ICAP	MG/KG	1.1	U					
SM08 CHROMIUM	BY ICAP	MG/KG	3.1						
SM09 COPPER	BY ICAP	MG/KG	8.5	U					
SM10 IRON	BY ICAP	MG/KG	15000						
SM11 MANGANESE	BY ICAP	MG/KG	1800	J					
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A	O					
SM13 NICKEL	BY ICAP	MG/KG	8.6	U					
SM14 LEAD	BY ICAP	MG/KG	680						
SM15 ANTIMONY	BY ICAP	MG/KG	13	U					
SM16 SELENIUM	BY ICAP	MG/KG	1.1	U					
SM17 TITANIUM	BY ICAP	MG/KG	N/A	O					
SM18 THALLIUM	BY ICAP	MG/KG	2.2	U					
SM19 VANADIUM	BY ICAP	MG/KG	11	U					
SM20 ZINC	BY ICAP	MG/KG	290						
SM21 CALCIUM	BY ICAP	MG/KG	66000						
SM22 MAGNESIUM	BY ICAP	MG/KG	35500						
SM23 SODIUM	BY ICAP	MG/KG	1100	U					
SM24 POTASSIUM	BY ICAP	MG/KG	1100	U					
WF01 WATER TEMP		'C			24	27	26	25	23
WF05 PH, FIELD		SU			6.96	7.23	7.20	7.48	7.27

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	213	214	215	215L	215R	215S
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	216		217		218		219		219L		219R	
WF01 WATER TEMP		'C	27		23		27		25					
WF05 PH, FIELD		SU	7.26		7.58		7.34		7.46					
WF10 CONDUCTIVITY (FIELD)		UMHOS	348		650		205		315					
WM01 SILVER	BY ICAP	UG/L	10	U	10	U	10	U	10	U	N/A	0	N/A	0
WM02 ALUMINUM	BY ICAP	UG/L	220	U	200	U	360	U	200	U	N/A	0	N/A	0
WM03 ARSENIC	BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	40	
WM04 BARIUM	BY ICAP	UG/L	200	U	200	U	200	U	200	U	N/A	0	N/A	0
WM05 BERYLLIUM	BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	N/A	0	N/A	0
WM06 CADMIUM	BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	N/A	0	N/A	0
WM07 COBALT	BY ICAP	UG/L	50	U	50	U	50	U	50	U	N/A	0	N/A	0
WM08 CHROMIUM	BY ICAP	UG/L	10	U	12	U	10	U	10	U	N/A	0	N/A	0
WM09 COPPER	BY ICAP	UG/L	25	U	25	U	25	U	25	U	N/A	0	N/A	0
WM10 IRON	BY ICAP	UG/L	290		770		450		160		N/A	0	N/A	0
WM11 MANGANESE	BY ICAP	UG/L	62		17		73		61		N/A	0	N/A	0
WM12 MOLYBDENUM	BY ICAP	UG/L	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0
WM13 NICKEL	BY ICAP	UG/L	40	U	40	U	40	U	40	U	N/A	0	N/A	0
WM14 LEAD	BY ICAP	UG/L	49		22		3.0	U	26	J	28		20	
WM15 ANTIMONY	BY ICAP	UG/L	60	U	60	U	60	U	60	U	N/A	0	N/A	0
WM16 SELENIUM	BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	
WM17 TITANIUM	BY ICAP	UG/L	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0
WM18 THALLIUM	BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	50	
WM19 VANADIUM	BY ICAP	UG/L	50	U	50	U	50	U	50	U	N/A	0	N/A	0
WM20 ZINC	BY ICAP	UG/L	130		34	U	20	U	91		N/A	0	N/A	0
WM21 CALCIUM, TOTAL BY ICAP		MG/L	50		71		34		51		N/A	0	N/A	0
WM22 MAGNESIUM, TOTAL BY ICAP		MG/L	27		44		15		28		N/A	0	N/A	0
WM23 SODIUM, TOTAL BY ICAP		MG/L	5.3		71		5.0	U	5.8		N/A	0	N/A	0

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	216	217	218	219	219L	219R
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	5.0 U	14	5.0 U	5.0 U	N/A O	N/A O
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U	10 U		
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200 U	200 U	200 U	200 U		
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U	10 U		
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200 U	200 U	200 U	200 U		
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U		
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U		
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50 U	50 U	50 U	50 U		
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10 U	18 U	10 U	10 U		
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25 U	25 U	25 U	25 U		
WM44 IRON,DISSOLVED BY ICAP	UG/L	100 U	100 U	100 U	100 U		
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	44	15 U	35	36		
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O		
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	40 U	40 U	40 U	40 U		
WM48 LEAD,DISSOLVED BY ICAP	UG/L	9.5	11	3.0 U	8.2 J		
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60 U	60 U	60 U	60 U		
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U		
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O		
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10 U	10 U	10 U	10 U		
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50 U	50 U	50 U	50 U		
WM54 ZINC,DISSOLVED BY ICAP	UG/L	100	31 U	20 U	62		
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	54	77	37	53		
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	30	48	16	29		
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	5.9	76	5.0 U	6.1		
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	5.0 U	16	5.0 U	5.0 U		
ZZ01 SAMPLE NUMBER	NA	216	217	218	219	219	219

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	216	217	218	219	219L	219R
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	219S	220	220L	220R	220S	300
WF01 WATER TEMP	'C		26				22
WF05 PH, FIELD	SU		7.4				7.38
WF10 CONDUCTIVITY (FIELD)	UMHOS		310				600
WM01 SILVER BY ICAP	UG/L	N/A O	10 U	10 U	50	55	10 U
WM02 ALUMINUM BY ICAP	UG/L	N/A O	210	200 U	2000	2200	250
WM03 ARSENIC BY ICAP	UG/L	44	10 U	N/A O	N/A O	N/A O	10 U
WM04 BARIUM BY ICAP	UG/L	N/A O	200 U	200 U	2000	2200	200 U
WM05 BERYLLIUM BY ICAP	UG/L	N/A O	5.0 U	5.0 U	50	47	5.0 U
WM06 CADMIUM BY ICAP	UG/L	N/A O	5.0 U	5.0 U	50	62	5.5
WM07 COBALT BY ICAP	UG/L	N/A O	50 U	50 U	500	510	50 U
WM08 CHROMIUM BY ICAP	UG/L	N/A O	10 U	10 U	200	200	10 U
WM09 COPPER BY ICAP	UG/L	N/A O	25 U	25 U	250	250	25 U
WM10 IRON BY ICAP	UG/L	N/A O	340	330	1000	1300	1700
WM11 MANGANESE BY ICAP	UG/L	N/A O	99	99	500	610	360
WM12 MOLYBDENUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM13 NICKEL BY ICAP	UG/L	N/A O	40 U	40 U	500	510	40 U
WM14 LEAD BY ICAP	UG/L	44	49 J	69	500	620	250 J
WM15 ANTIMONY BY ICAP	UG/L	N/A O	60 U	60 U	500	520	60 U
WM16 SELENIUM BY ICAP	UG/L	12	5.0 U	N/A O	N/A O	N/A O	5.0 U
WM17 TITANIUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM18 THALLIUM BY ICAP	UG/L	48	10 U	N/A O	N/A O	N/A O	10 U
WM19 VANADIUM BY ICAP	UG/L	N/A O	50 U	50 U	500	510	50 U
WM20 ZINC BY ICAP	UG/L	N/A O	70	68	500	580	3400
WM21 CALCIUM, TOTAL BY ICAP	MG/L	N/A O	51	51	N/A O	N/A O	130
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	N/A O	28	28	N/A O	N/A O	52
WM23 SODIUM, TOTAL BY ICAP	MG/L	N/A O	6.3	6.3	N/A O	N/A O	5.0 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	219S		220		220L		220R		220S		300	
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	N/A	O	5.0	U	5.0	U	N/A	O	N/A	O	6.0	
WM35 SILVER,DISSOLVED BY ICAP	UG/L			10	U							10	U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L			200	U							200	U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L			10	U							10	U
WM38 BARIUM,DISSOLVED BY ICAP	UG/L			200	U							200	U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L			5.0	U							5.0	U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L			5.0	U							5.0	U
WM41 COBALT,DISSOLVED BY ICAP	UG/L			50	U							50	U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L			10	U							10	U
WM43 COPPER,DISSOLVED BY ICAP	UG/L			25	U							25	U
WM44 IRON,DISSOLVED BY ICAP	UG/L			100	U							100	U
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L			43								15	U
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L			N/A	O							N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L			40	U							40	U
WM48 LEAD,DISSOLVED BY ICAP	UG/L			11	J							N/A	I
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L			60	U							60	U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L			5.0	U							5.0	U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L			N/A	O							N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L			10	U							10	U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L			50	U							50	U
WM54 ZINC,DISSOLVED BY ICAP	UG/L			39								1900	
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L			51								120	
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L			28								49	
WM57 SODIUM,DISSOLVED BY ICAP	MG/L			6.5								5.0	U
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L			5.0	U							5.0	U
ZZ01 SAMPLE NUMBER	NA	219		220		220		220		220		300	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	219S	220	220L	220R	220S	300
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	301	301L	301R	301S	302	303
WF01 WATER TEMP	'C	17				28	28
WF05 PH. FIELD	SU	7.16				7 25	7.07
WF10 CONDUCTIVITY (FIELD)	UMHOS	550				600	1100
WM01 SILVER BY ICAP	UG/L	10 U	N/A 0	N/A 0	N/A 0	10 U	14
WM02 ALUMINUM BY ICAP	UG/L	200 U	N/A 0	N/A 0	N/A 0	790	29000
WM03 ARSENIC BY ICAP	UG/L	10 U	N/A 0	N/A 0	N/A 0	10 U	21
WM04 BARIUM BY ICAP	UG/L	200 U	N/A 0	N/A 0	N/A 0	200 U	510 U
WM05 BERYLLIUM BY ICAP	UG/L	5.0 U	N/A 0	N/A 0	N/A 0	5.0 U	5.0 U
WM06 CADMIUM BY ICAP	UG/L	5.0 U	N/A 0	N/A 0	N/A 0	5.0 U	190
WM07 COBALT BY ICAP	UG/L	50 U	N/A 0	N/A 0	N/A 0	50 U	85
WM08 CHROMIUM BY ICAP	UG/L	10 U	N/A 0	N/A 0	N/A 0	10 U	30
WM09 COPPER BY ICAP	UG/L	25 U	N/A 0	N/A 0	N/A 0	25 U	140
WM10 IRON BY ICAP	UG/L	100 U	N/A 0	N/A 0	N/A 0	2100	75000
WM11 MANGANESE BY ICAP	UG/L	15 U	N/A 0	N/A 0	N/A 0	570	8.9
WM12 MOLYBDENUM BY ICAP	UG/L	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0
WM13 NICKEL BY ICAP	UG/L	53	N/A 0	N/A 0	N/A 0	40 U	92
WM14 LEAD BY ICAP	UG/L	36 J	N/A 0	N/A 0	N/A 0	86 J	14000 J
WM15 ANTIMONY BY ICAP	UG/L	60 U	N/A 0	N/A 0	N/A 0	60 U	60 U
WM16 SELENIUM BY ICAP	UG/L	5.0 U	N/A 0	N/A 0	N/A 0	5.0 U	5.0 U
WM17 TITANIUM BY ICAP	UG/L	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0	N/A 0
WM18 THALLIUM BY ICAP	UG/L	10 U	N/A 0	N/A 0	N/A 0	10 U	10 U
WM19 VANADIUM BY ICAP	UG/L	50 U	N/A 0	N/A 0	N/A 0	50 U	81
WM20 ZINC BY ICAP	UG/L	180	N/A 0	N/A 0	N/A 0	98	9100
WM21 CALCIUM, TOTAL BY ICAP	MG/L	110	N/A 0	N/A 0	N/A 0	130	460
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	64	N/A 0	N/A 0	N/A 0	59	210
WM23 SODIUM, TOTAL BY ICAP	MG/L	9.8	N/A 0	N/A 0	N/A 0	5.0 U	6.1

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	301		301L		301R		301S		302		303	
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	5.0	U	N/A	O	N/A	O	N/A	O	5.0	U	12	
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10	U							10	U	10	U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200	U							200	U	200	U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10	U							10	U	10	U
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200	U							200	U	200	U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0	U							5.0	U	5.0	U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0	U							5.0	U	5.0	U
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50	U							50	U	50	U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10	U							10	U	10	U
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25	U							25	U	25	U
WM44 IRON,DISSOLVED BY ICAP	UG/L	100	U							100	U	100	U
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	15	U							350		1800	
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A	O							N/A	O	N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	60								40	U	40	U
WM48 LEAD,DISSOLVED BY ICAP	UG/L	33	J							N/A	I	N/A	I
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60	U							60	U	60	U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0	U							5.0	U	5.0	U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A	O							N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10	U							10	U	10	U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50	U							50	U	50	U
WM54 ZINC,DISSOLVED BY ICAP	UG/L	190								27		65	
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	110								130		230	
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	66								59		89	
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	10								5.0	U	6.5	
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	5.0	U							5.0	U	8.1	
ZZ01 SAMPLE NUMBER	NA	301		301		301		301		302		303	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	301	301L	301R	301S	302	303
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	304	305	306	307	308	309
WF01 WATER TEMP	'C	25	21	25	17	18	18
WF05 PH, FIELD	SU	7.57	10.62	7.39	6.92	6.97	6.56
WF10 CONDUCTIVITY (FIELD)	UMHOS	600	2100	1400	550	680	1400
WM01 SILVER BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
WM02 ALUMINUM BY ICAP	UG/L	200 U	200 U	200 U	200 U	200 U	470
WM03 ARSENIC BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	59
WM04 BARIUM BY ICAP	UG/L	200 U	200 U	200 U	200 U	200 U	210
WM05 BERYLLIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM06 CADMIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	6.9
WM07 COBALT BY ICAP	UG/L	50 U	50 U	400	50 U	50 U	50 U
WM08 CHROMIUM BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
WM09 COPPER BY ICAP	UG/L	25 U	25 U	25 U	25 U	25 U	25 U
WM10 IRON BY ICAP	UG/L	370	100 U	2000	100 U	100 U	12
WM11 MANGANESE BY ICAP	UG/L	51	93	2200	15 U	15 U	200
WM12 MOLYBDENUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM13 NICKEL BY ICAP	UG/L	40 U	40 U	310	40 U	40 U	61
WM14 LEAD BY ICAP	UG/L	63 J	5.1 J	330 J	17 J	3.0 U	680 J
WM15 ANTIMONY BY ICAP	UG/L	60 U	60 U	60 U	60 U	60 U	60 U
WM16 SELENIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM17 TITANIUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM18 THALLIUM BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
WM19 VANADIUM BY ICAP	UG/L	50 U	50 U	50 U	50 U	50 U	50 U
WM20 ZINC BY ICAP	UG/L	200	20 U	8900	140	26	850
WM21 CALCIUM, TOTAL BY ICAP	MG/L	110	430	260	110	62	220
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	60	73	130	61	46	64
WM23 SODIUM, TOTAL BY ICAP	MG/L	7.7	57	24	7.9	14	63

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	304		305		306		307		308		309	
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	5.0	U	110		11		5.0	U	5.0	U	27	
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	200	U	200	U	200	U	200	U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	37	
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	200	U	200	U	200	U	210	
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50	U	50	U	400		50	U	50	U	50	U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25	U	25	U	25	U	25	U	25	U	25	U
WM44 IRON,DISSOLVED BY ICAP	UG/L	100	U	100	U	100	U	100	U	100	U	7900	
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	15	U	15	U	2200		15	U	15	U	170	
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	40	U	40	U	320		43		40	U	40	U
WM48 LEAD,DISSOLVED BY ICAP	UG/L	20	J	N/A	I	29	J	14	J	N/A	I	4.1	U
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60	U	60	U	60	U	60	U	60	U	60	U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50	U	50	U	50	U	50	U	50	U	50	U
WM54 ZINC,DISSOLVED BY ICAP	UG/L	160		20	U	6400		140		31		520	
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	110		390		270		110		67		230	
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	60		5.0	U	130		65		50		67	
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	7.9		58		25		8.1		15		68	
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	5.0	U	110		12		5.0	U	5.0	U	28	
ZZ01 SAMPLE NUMBER	NA	304		305		306		307		308		309	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	304	305	306	307	308	309
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	309D		309L	309R	309S	310		311	
WF01 WATER TEMP	'C						15		17	
WF05 PH, FIELD	SU						6.78		6.56	
WF10 CONDUCTIVITY (FIELD)	UMHOS						900		1100	
WM01 SILVER BY ICAP	UG/L	10	U				10	U	10	U
WM02 ALUMINUM BY ICAP	UG/L	420					200	U	1800	
WM03 ARSENIC BY ICAP	UG/L	59					25		64	
WM04 BARIUM BY ICAP	UG/L	210					200	U	200	U
WM05 BERYLLIUM BY ICAP	UG/L	5.0	U				5.0	U	5.0	U
WM06 CADMIUM BY ICAP	UG/L	8.0					5.0	U	11	
WM07 COBALT BY ICAP	UG/L	50	U				50	U	50	U
WM08 CHROMIUM BY ICAP	UG/L	10	U				10	U	10	U
WM09 COPPER BY ICAP	UG/L	25	U				25	U	25	U
WM10 IRON BY ICAP	UG/L	12					750		51	
WM11 MANGANESE BY ICAP	UG/L	200					120		6900	
WM12 MOLYBDENUM BY ICAP	UG/L	N/A	O				N/A	O	N/A	O
WM13 NICKEL BY ICAP	UG/L	49					40	U	64	
WM14 LEAD BY ICAP	UG/L	650	J				23	J	5000	J
WM15 ANTIMONY BY ICAP	UG/L	60	U				60	U	60	U
WM16 SELENIUM BY ICAP	UG/L	5.0	U				5.0	U	5.0	U
WM17 TITANIUM BY ICAP	UG/L	N/A	O				N/A	O	N/A	O
WM18 THALLIUM BY ICAP	UG/L	10	U				10	U	10	U
WM19 VANADIUM BY ICAP	UG/L	50	U				50	U	50	U
WM20 ZINC BY ICAP	UG/L	830					94		530	
WM21 CALCIUM, TOTAL BY ICAP	MG/L	220					210		470	
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	64					72		220	
WM23 SODIUM, TOTAL BY ICAP	MG/L	63					5.0	U	5.0	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	309D		309L		309R		309S		310		311	
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	28								5.8		6.9	
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10	U	10	U	50		44		10	U	10	U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	2000		2200		200	U	200	U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	37		36		40		40		17		34	
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	210		210		2000		2400		200	U	200	U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	50		51		5.0	U	5.0	U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	50		57		5.0	U	5.0	U
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50	U	50	U	500		550		50	U	50	U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	200		210		10	U	10	U
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25	U	25	U	250		260		25	U	25	U
WM44 IRON,DISSOLVED BY ICAP	UG/L	8200		7900		1000		8700		510		9300	
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	180		170		500		710		130		340	
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	40	U	43		500		560		40	U	40	U
WM48 LEAD,DISSOLVED BY ICAP	UG/L	3.3	U	3.3		20		22		3.0	U	3.0	U
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60	U	60	U	500		570		60	U	60	U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	10		6.1		5.0	U	5.0	U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	50		46		10	U	10	U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50	U	50	U	500		550		50	U	50	U
WM54 ZINC,DISSOLVED BY ICAP	UG/L	550		520		500		1100		290		20	U
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	240		220		N/A	O	N/A	O	220		160	
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	70		66		N/A	O	N/A	O	77		47	
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	71		66		N/A	O	N/A	O	5.0	U	5.0	U
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	30		28		N/A	O	N/A	O	5.7		5.0	U
ZZ01 SAMPLE NUMBER	NA	309		309		309		309		310		311	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	309D	309L	309R	309S	310	311
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	312	314	315	316	317	318
WF01 WATER TEMP	'C	16	25	25	20	20	17
WF05 PH. FIELD	SU	6.45	7.15	7.05	6.93	7.11	7.04
WF10 CONDUCTIVITY (FIELD)	UMHOS	700	470	420	600	700	550
WM01 SILVER BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
WM02 ALUMINUM BY ICAP	UG/L	200 U	2800	2900	5200	4100	200 U
WM03 ARSENIC BY ICAP	UG/L	110	14	14	46	85	10 U
WM04 BARIUM BY ICAP	UG/L	200 U	200 U	200 U	200 U	200 U	200 U
WM05 BERYLLIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM06 CADMIUM BY ICAP	UG/L	37	5.0 U	8.6	30	26	5.0 U
WM07 COBALT BY ICAP	UG/L	350	85	56	170	53	50 U
WM08 CHROMIUM BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
WM09 COPPER BY ICAP	UG/L	28 U	78 U	140	240	44 U	25 U
WM10 IRON BY ICAP	UG/L	36	11000	15000	67	66	170 U
WM11 MANGANESE BY ICAP	UG/L	370	1400	1800	9000	8900	46
WM12 MOLYBDENUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM13 NICKEL BY ICAP	UG/L	660	83	70	170	60	52
WM14 LEAD BY ICAP	UG/L	9300 J	1700 J	3800 J	8200 J	10000 J	63 J
WM15 ANTIMONY BY ICAP	UG/L	60 U	60 U	60 U	66 U	60 U	60 U
WM16 SELENIUM BY ICAP	UG/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM17 TITANIUM BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM18 THALLIUM BY ICAP	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
WM19 VANADIUM BY ICAP	UG/L	50 U	50 U	50 U	50 U	50 U	50 U
WM20 ZINC BY ICAP	UG/L	26	470	560	2500	1400	180
WM21 CALCIUM, TOTAL BY ICAP	MG/L	270	150	120	450	450	110
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L	87	68	71	270	270	62
WM23 SODIUM, TOTAL BY ICAP	MG/L	7.3	5.0 U	5.0 U	5.0 U	5.0 U	9.5

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	312		314		315		316		317		318	
WM24 POTASSIUM, TOTAL BY ICAP	MG/L	9.8		5.3		5.9		12		10		5.0	U
WM35 SILVER,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	200	U	200	U	200	U	200	U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	51		10	U
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200	U	200	U	200	U	200	U	200	U	200	U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	27		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM41 COBALT,DISSOLVED BY ICAP	UG/L	360		55		50	U	50	U	50	U	50	U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25	U	25	U	25	U	25	U	25	U	25	U
WM44 IRON,DISSOLVED BY ICAP	UG/L	100	U	100	U	100	U	100	U	100	U	100	U
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	180		96		45		70		43		22	
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	620		43		40	U	40	U	40	U	86	
WM48 LEAD,DISSOLVED BY ICAP	UG/L	60		74		9.3		46		3.0	U	28	
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60	U	60	U	60	U	60	U	60	U	60	U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50	U	50	U	50	U	50	U	50	U	50	U
WM54 ZINC,DISSOLVED BY ICAP	UG/L	23000		170		20	U	450		20	U	160	
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	270		93		46		61		84		110	
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	88		40		35		62		89		64	
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	7.6		5.0	U	5.0	U	5.0	U	5.0	U	9.8	
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	10		5.0	U	5.0	U	7.5		7.0		5.0	U
ZZ01 SAMPLE NUMBER	NA	312		314		315		316		317		318	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	312	314	315	316	317	318
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	318L	318R	318S	319		319L	319R
WF01 WATER TEMP	'C				19			
WF05 PH, FIELD	SU				7.54			
WF10 CONDUCTIVITY (FIELD)	UMHOS				650			
WM01 SILVER BY ICAP	UG/L				10	U		
WM02 ALUMINUM BY ICAP	UG/L				200	U		
WM03 ARSENIC BY ICAP	UG/L				10	U		
WM04 BARIUM BY ICAP	UG/L				200	U		
WM05 BERYLLIUM BY ICAP	UG/L				5.0	U		
WM06 CADMIUM BY ICAP	UG/L				5.0	U		
WM07 COBALT BY ICAP	UG/L				50	U		
WM08 CHROMIUM BY ICAP	UG/L				10	U		
WM09 COPPER BY ICAP	UG/L				25	U		
WM10 IRON BY ICAP	UG/L				140	U		
WM11 MANGANESE BY ICAP	UG/L				22			
WM12 MOLYBDENUM BY ICAP	UG/L				N/A	O		
WM13 NICKEL BY ICAP	UG/L				40	U		
WM14 LEAD BY ICAP	UG/L				43	J		
WM15 ANTIMONY BY ICAP	UG/L				60	U		
WM16 SELENIUM BY ICAP	UG/L				5.0	U		
WM17 TITANIUM BY ICAP	UG/L				N/A	O		
WM18 THALLIUM BY ICAP	UG/L				10	U		
WM19 VANADIUM BY ICAP	UG/L				50	U		
WM20 ZINC BY ICAP	UG/L				170			
WM21 CALCIUM, TOTAL BY ICAP	MG/L				120			
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L				77			
WM23 SODIUM, TOTAL BY ICAP	MG/L				14			

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	318L	318R	318S	319	319L	319R
WM24 POTASSIUM, TOTAL BY ICAP	MG/L				7.0		
WM35 SILVER,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	10 U	10 U	50
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	200 U	200 U	2000
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	10 U	40	38	10 U	N/A O	N/A O
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	200 U	200 U	2000
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	5.0 U	5.0 U	50
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	5.0 U	5.0 U	50
WM41 COBALT,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	50 U	50 U	500
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	10 U	10 U	200
WM43 COPPER,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	25 U	25 U	250
WM44 IRON,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	100 U	140	1000
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	15 U	19	500
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	40 U	40 U	500
WM48 LEAD,DISSOLVED BY ICAP	UG/L	61	20	50	4.4 U	N/A O	N/A O
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	60 U	60 U	500
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0 U	10	5.3	5.0 U	N/A O	N/A O
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	N/A O	N/A O	N/A O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10 U	50	73	10 U	N/A O	N/A O
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	50 U	50 U	500
WM54 ZINC,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O	450	170	500
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	N/A O	N/A O	N/A O	120	120	N/A O
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	N/A O	N/A O	N/A O	81	77	N/A O
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	N/A O	N/A O	N/A O	45	14	N/A O
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	N/A O	N/A O	N/A O	6.4	7.4	N/A O
ZZ01 SAMPLE NUMBER	NA	318	318	318	319	319	319

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	318L	318R	318S	319	319L	319R
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	319S	320F		321F		322F		323F		324	
WF01 WATER TEMP	'C										15	
WF05 PH, FIELD	SU										7.10	
WF10 CONDUCTIVITY (FIELD)	UMHOS										700	
WM01 SILVER BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM02 ALUMINUM BY ICAP	UG/L		200	U	200	U	200	U	200	U	200	U
WM03 ARSENIC BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM04 BARIUM BY ICAP	UG/L		200	U	200	U	200	U	200	U	200	U
WM05 BERYLLIUM BY ICAP	UG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM06 CADMIUM BY ICAP	UG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM07 COBALT BY ICAP	UG/L		50	U	50	U	50	U	50	U	50	U
WM08 CHROMIUM BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM09 COPPER BY ICAP	UG/L		25	U	25	U	25	U	25	U	25	U
WM10 IRON BY ICAP	UG/L		100	U	100	U	100	U	100	U	100	U
WM11 MANGANESE BY ICAP	UG/L		15	U	15	U	15	U	15	U	15	U
WM12 MOLYBDENUM BY ICAP	UG/L		N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM13 NICKEL BY ICAP	UG/L		40	U	40	U	40	U	40	U	51	
WM14 LEAD BY ICAP	UG/L		N/A	I	N/A	I	3.2	J	N/A	I	37	J
WM15 ANTIMONY BY ICAP	UG/L		60	U	60	U	60	U	60	U	60	U
WM16 SELENIUM BY ICAP	UG/L		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
WM17 TITANIUM BY ICAP	UG/L		N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM18 THALLIUM BY ICAP	UG/L		10	U	10	U	10	U	10	U	10	U
WM19 VANADIUM BY ICAP	UG/L		50	U	50	U	50	U	50	U	50	U
WM20 ZINC BY ICAP	UG/L		20	U	20	U	20	U	20	U	160	
WM21 CALCIUM, TOTAL BY ICAP	MG/L		5.0	U	5.0	U	5.0	U	5.0	U	110	
WM22 MAGNESIUM, TOTAL BY ICAP	MG/L		5.0	U	5.0	U	5.0	U	5.0	U	62	
WM23 SODIUM, TOTAL BY ICAP	MG/L		5.0	U	5.0	U	5.0	U	5.0	U	9.2	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	319S	320F	321F	322F	323F	324
WM24 POTASSIUM, TOTAL BY ICAP	MG/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
WM35 SILVER,DISSOLVED BY ICAP	UG/L	52		10 U	10 U	10 U	10 U
WM36 ALUMINUM,DISSOLVED BY ICAP	UG/L	2000		200 U	200 U	200 U	200 U
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	N/A O		10 U	10 U	10 U	10 U
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	2000		200 U	200 U	200 U	200 U
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	46		5.0 U	5.0 U	5.0 U	5.0 U
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	56		5.0 U	5.0 U	5.0 U	5.0 U
WM41 COBALT,DISSOLVED BY ICAP	UG/L	470		50 U	50 U	50 U	50 U
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	180		10 U	10 U	10 U	10 U
WM43 COPPER,DISSOLVED BY ICAP	UG/L	240		25 U	25 U	25 U	25 U
WM44 IRON,DISSOLVED BY ICAP	UG/L	1100		100 U	100 U	100 U	100 U
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	490		15 U	15 U	15 U	15 U
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A O		N/A O	N/A O	N/A O	N/A O
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	490		40 U	40 U	40 U	88
WM48 LEAD,DISSOLVED BY ICAP	UG/L	N/A O		3.0 U	3.0 U	3.0 U	28
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	470		60 U	60 U	60 U	60 U
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	N/A O		5.0 U	5.0 U	5.0 U	5.0 U
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A O		N/A O	N/A O	N/A O	N/A O
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	N/A O		10 U	10 U	10 U	10 U
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	480		50 U	50 U	50 U	50 U
WM54 ZINC,DISSOLVED BY ICAP	UG/L	640		20 U	20 U	20 U	170
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	N/A O		5.0 U	5.0 U	5.0 U	110
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	N/A O		5.0 U	5.0 U	5.0 U	65
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	N/A O		5.0 U	5.0 U	5.0 U	9.7
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	N/A O		5.0 U	5.0 U	5.0 U	5.0 U
ZZ01 SAMPLE NUMBER	NA	319	320	321	322	323	324

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	319S	320F	321F	322F	323F	324
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	324F		325F		400	402	403	403L
WM02 ALUMINUM	BY ICAP	UG/L	200	U	200	U				
WM03 ARSENIC	BY ICAP	UG/L	10	U	10	U				
WM04 BARIUM	BY ICAP	UG/L	200	U	200	U				
WM05 BERYLLIUM	BY ICAP	UG/L	5.0	U	5.0	U				
WM06 CADMIUM	BY ICAP	UG/L	5.0	U	5.0	U				
WM07 COBALT	BY ICAP	UG/L	50	U	50	U				
WM08 CHROMIUM	BY ICAP	UG/L	10	U	10	U				
WM09 COPPER	BY ICAP	UG/L	25	U	25	U				
WM10 IRON	BY ICAP	UG/L	100	U	100	U				
WM11 MANGANESE	BY ICAP	UG/L	15	U	15	U				
WM12 MOLYBDENUM	BY ICAP	UG/L	N/A	O	N/A	O				
WM13 NICKEL	BY ICAP	UG/L	40	U	40	U				
WM14 LEAD	BY ICAP	UG/L	N/A	I	N/A	I				
WM15 ANTIMONY	BY ICAP	UG/L	60	U	60	U				
WM16 SELENIUM	BY ICAP	UG/L	5.0	U	5.0	U				
WM17 TITANIUM	BY ICAP	UG/L	N/A	O	N/A	O				
WM18 THALLIUM	BY ICAP	UG/L	10	U	10	U				
WM19 VANADIUM	BY ICAP	UG/L	50	U	50	U				
WM20 ZINC	BY ICAP	UG/L	27		20	U				
WM21 CALCIUM, TOTAL BY ICAP		MG/L	5.0	U	5.0	U				
WM22 MAGNESIUM, TOTAL BY ICAP		MG/L	5.0	U	5.0	U				
WM23 SODIUM, TOTAL BY ICAP		MG/L	5.0	U	5.0	U				
WM24 POTASSIUM, TOTAL BY ICAP		MG/L	5.0	U	5.0	U				
WM35 SILVER,DISSOLVED	BY ICAP	UG/L	10	U						
WM36 ALUMINUM,DISSOLVED	BY ICAP	UG/L	200	U						
WM37 ARSENIC,DISSOLVED	BY ICAP	UG/L	10	U						

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	324F		325F	400	402	403	403L
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	200	U					
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	5.0	U					
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	5.0	U					
WM41 COBALT,DISSOLVED BY ICAP	UG/L	50	U					
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	10	U					
WM43 COPPER,DISSOLVED BY ICAP	UG/L	25	U					
WM44 IRON,DISSOLVED BY ICAP	UG/L	100	U					
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	15	U					
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A	O					
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	40	U					
WM48 LEAD,DISSOLVED BY ICAP	UG/L	3.0	U					
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	60	U					
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	5.0	U					
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A	O					
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	10	U					
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	50	U					
WM54 ZINC,DISSOLVED BY ICAP	UG/L	20	U					
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	5.0	U					
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	5.0	U					
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	5.0	U					
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	5.0	U					
ZZ01 SAMPLE NUMBER	NA	324		325	400	402	403	403
ZZ02 ACTIVITY CODE	NA	CSXCR		CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT				***	***	***	***

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	324F	325F	400	402	403	403L
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM25 TIN	UG/M3						ATTACHMENT
WM01 SILVER BY ICAP	UG/L	10 U	10 U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	404	406	407	408	408L	409
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM25 TIN	UG/M3					ATTACHMENT	
ZZ01 SAMPLE NUMBER	NA	404	406	407	408	408	409

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	404	406	407	408	408L	409
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	410	411	412	413	414	415
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
ZZ01 SAMPLE NUMBER	NA	410	411	412	413	414	415
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	410	411	412	413	414	415
Z299 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	416	417	418	419	420	421
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
ZZ01 SAMPLE NUMBER	NA	416	417	418	419	420	421
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	416	417	418	419	420	421
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	422	422L	423	424	424F	425
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*	ATTACHMENT
AM25 TIN	UG/M3		ATTACHMENT		ATTACHMENT		
ZZ01 SAMPLE NUMBER	NA	422	422	423	424	424	425

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	422	422L	423	424	424F	425
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	426	427	428	429	430	431
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
ZZ01 SAMPLE NUMBER	NA	426	427	428	429	430	431
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	426	427	428	429	430	431
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	432	432F	433	433L	434	435
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	*	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM25 TIN	UG/M3	ATTACHMENT			ATTACHMENT		
ZZ01 SAMPLE NUMBER	NA	432	432	433	433	434	435

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY O-CSXCR

COMPOUND	UNITS	432	432F	433	433L	434	435
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	436	437	438	439	440	440F
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	*
AM25 TIN	UG/M3					ATTACHMENT	
ZZ01 SAMPLE NUMBER	NA	436	437	438	439	440	440

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY. O-CSXCR

COMPOUND	UNITS	436	437	438	439	440	440F
Z202 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
Z299 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	441	442	443	444	445	446
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
ZZ01 SAMPLE NUMBER	NA	441	442	443	444	445	446
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	441	442	443	444	445	446
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT.	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	448	449	900M	901R	901S	902A
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM25 TIN	UG/M3			ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
ZZ01 SAMPLE NUMBER	NA	448	449	900	901	901	902

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	448	449	900M	901R	901S	902A
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	902C	903M	904R	904S	905A	905C
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
AM25 TIN	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
ZZ01 SAMPLE NUMBER	NA	902	903	904	904	905	905

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND	UNITS	902C	903M	904R	904S	905A	905C
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT.	***	***	***	***	***	***

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	906M	907A	907C	908M	909A	909C
AM01 PARTICULATE LEAD IN AIR BY HIVOL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM02 SILVER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM03 ALUMINUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM04 ARSENIC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM05 BARIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM06 BERYLLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM07 CADMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM08 COBALT	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM09 CHROMIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM10 COPPER	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM11 IRON	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM12 MANGANESE	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM13 NICKEL	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM14 ANTIMONY	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM15 SELENIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM16 TITANIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM17 THALLIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM18 VANADIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM19 MOLYBDENUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM20 ZINC	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM21 CALCIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM22 MAGNESIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM23 SODIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM24 POTASSIUM	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
AM25 TIN	UG/M3	ATTACHMENT	ATTACHMENT	ATTACHMENT			
WM01 SILVER BY ICAP	UG/L				10 U	500	500

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

	COMPOUND	UNITS	906M	907A	907C	908M	909A	909C
WM02	ALUMINUM BY ICAP	UG/L				200 U	2000	2000
WM03	ARSENIC BY ICAP	UG/L				10 U	44	47
WM04	BARIUM BY ICAP	UG/L				200 U	1900	2000
WM05	BERYLLIUM BY ICAP	UG/L				5.0 U	470	480
WM06	CADMIUM BY ICAP	UG/L				5.0 U	490	500
WM07	COBALT BY ICAP	UG/L				50 U	480	500
WM08	CHROMIUM BY ICAP	UG/L				10 U	500	510
WM09	COPPER BY ICAP	UG/L				25 U	490	520
WM10	IRON BY ICAP	UG/L				100 U	1900	2000
WM11	MANGANESE BY ICAP	UG/L				15 U	480	500
WM12	MOLYBDENUM BY ICAP	UG/L				N/A O	N/A O	N/A O
WM13	NICKEL BY ICAP	UG/L				40 U	460	480
WM14	LEAD BY ICAP	UG/L				3.0 U	98	98
WM15	ANTIMONY BY ICAP	UG/L				60 U	1000	980
WM16	SELENIUM BY ICAP	UG/L				5.0 U	46	53
WM17	TITANIUM BY ICAP	UG/L				N/A O	N/A O	N/A O
WM18	THALLIUM BY ICAP	UG/L				10 U	100	97
WM19	VANADIUM BY ICAP	UG/L				50 U	470	490
WM20	ZINC BY ICAP	UG/L				20 U	2900	3100
WM21	CALCIUM, TOTAL BY ICAP	MG/L				5.0 U	48	49
WM22	MAGNESIUM, TOTAL BY ICAP	MG/L				5.0 U	25	25
WM23	SODIUM, TOTAL BY ICAP	MG/L				5.0 U	49	50
WM24	POTASSIUM, TOTAL BY ICAP	MG/L				5.0 U	49	49
ZZ01	SAMPLE NUMBER	NA	906	907	907	908	909	909
ZZ02	ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR
ZZ99	SAMPLE COLLECTION DATE & BATCH NUMBER	DT	***	***	***			

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	910M		911A		911C		912M		913A		913C	
WM35 SILVER,DISSOLVED	BY ICAP	UG/L	10	U	500		520		10	U	500		500	
WM36 ALUMINUM,DISSOLVED	BY ICAP	UG/L	200	U	2000		2100		200	U	2000		2000	
WM37 ARSENIC,DISSOLVED	BY ICAP	UG/L	10	U	47		41		10	U	47		43	
WM38 BARIUM,DISSOLVED	BY ICAP	UG/L	200	U	2000		2100		200	U	2000		2000	
WM39 BERYLLIUM,DISSOLVED	BY ICAP	UG/L	5.0	U	480		470		5.0	U	480		460	
WM40 CADMIUM,DISSOLVED	BY ICAP	UG/L	5.0	U	500		530		5.0	U	500		500	
WM41 COBALT,DISSOLVED	BY ICAP	UG/L	50	U	500		520		50	U	500		490	
WM42 CHROMIUM,DISSOLVED	BY ICAP	UG/L	10	U	510		510		10	U	510		480	
WM43 COPPER,DISSOLVED	BY ICAP	UG/L	25	U	520		520		25	U	520		500	
WM44 IRON,DISSOLVED	BY ICAP	UG/L	100	U	2000		2000		100	U	2000		2000	
WM45 MANGANESE,DISSOLVED	BY ICAP	UG/L	15	U	500		510		15	U	500		490	
WM46 MOLYBDENUM,DISSOLVED	BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM47 NICKEL,DISSOLVED	BY ICAP	UG/L	40	U	480		480		40	U	480		460	
WM48 LEAD,DISSOLVED	BY ICAP	UG/L	3.0	U	98		91		3.0	U	97		87	
WM49 ANTIMONY,DISSOLVED	BY ICAP	UG/L	60	U	980		970		60	U	980		1000	
WM50 SELENIUM,DISSOLVED	BY ICAP	UG/L	5.0	U	53		46		5.0	U	53		44	
WM51 TITANIUM,DISSOLVED	BY ICAP	UG/L	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O	N/A	O
WM52 THALLIUM,DISSOLVED	BY ICAP	UG/L	10	U	97		96		10	U	97		98	
WM53 VANADIUM,DISSOLVED	BY ICAP	UG/L	50	U	490		500		50	U	490		480	
WM54 ZINC,DISSOLVED	BY ICAP	UG/L	20	U	3100		3100		20	U	3100		3000	
WM55 CALCIUM,DISSOLVED	BY ICAP	MG/L	5.0	U	49		52		5.0	U	49		49	
WM56 MAGNESIUM,DISSOLVED	BY ICAP	MG/L	5.0	U	25		27		5.0	U	25		25	
WM57 SODIUM,DISSOLVED	BY ICAP	MG/L	5.0	U	50		52		5.0	U	50		49	
WM58 POTASSIUM,DISSOLVED	BY ICAP	MG/L	5.0	U	49		53		5.0	U	49		50	
ZZ01 SAMPLE NUMBER		NA	910		911		911		912		913		913	
ZZ02 ACTIVITY CODE		NA	CSXCR		CSXCR		CSXCR		CSXCR		CSXCR		CSXCR	

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

	COMPOUND	UNITS	914A	914C	914M	915A	915C	915M
SM01 SILVER	BY ICAP	MG/KG	22	23	2.0 U			
SM02 ALUMINUM	BY ICAP	MG/KG	320	320	40 U			
SM03 ARSENIC	BY ICAP	MG/KG	920	1100	2.0 U			
SM04 BARIUM	BY ICAP	MG/KG	4.8	40 U	40 U			
SM05 BERYLLIUM	BY ICAP	MG/KG	19	18	1.0 U			
SM06 CADMIUM	BY ICAP	MG/KG	45	45	1.0 U			
SM07 COBALT	BY ICAP	MG/KG	140	130	10 U			
SM08 CHROMIUM	BY ICAP	MG/KG	100	94	2.0 U			
SM09 COPPER	BY ICAP	MG/KG	6900	6800	5.0 U			
SM10 IRON	BY ICAP	MG/KG	22000	22000	20 U			
SM11 MANGANESE	BY ICAP	MG/KG	210	200	3.0 U			
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O			
SM13 NICKEL	BY ICAP	MG/KG	61	56	8.0 U			
SM14 LEAD	BY ICAP	MG/KG	240	230	1.0 U			
SM15 ANTIMONY	BY ICAP	MG/KG	210	240	12 U			
SM16 SELENIUM	BY ICAP	MG/KG	39	39	1.0 U			
SM17 TITANIUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O			
SM18 THALLIUM	BY ICAP	MG/KG	39	37	2.0 U			
SM19 VANADIUM	BY ICAP	MG/KG	66	65	10 U			
SM20 ZINC	BY ICAP	MG/KG	190	190	4.0 U			
SM21 CALCIUM	BY ICAP	MG/KG	190000	180000	1000 U			
SM22 MAGNESIUM	BY ICAP	MG/KG	120000	120000	1000 U			
SM23 SODIUM	BY ICAP	MG/KG	50	1000 U	1000 U			
SM24 POTASSIUM	BY ICAP	MG/KG	50	1000 U	1000 U			
WM01 SILVER	BY ICAP	UG/L				500	500	10 U
WM02 ALUMINUM	BY ICAP	UG/L				2000	2000	200 U

ANALYSIS REQUEST DETAIL REPORT   ACTIVITY: O-CSXCR

COMPOUND		UNITS	914A	914C	914M	915A	915C	915M
WM03 ARSENIC	BY ICAP	UG/L				47	43	10 U
WM04 BARIUM	BY ICAP	UG/L				2000	2000	200 U
WM05 BERYLLIUM	BY ICAP	UG/L				480	450	5.0 U
WM06 CADMIUM	BY ICAP	UG/L				500	500	5.0 U
WM07 COBALT	BY ICAP	UG/L				500	490	50 U
WM08 CHROMIUM	BY ICAP	UG/L				510	480	10 U
WM09 COPPER	BY ICAP	UG/L				520	490	25 U
WM10 IRON	BY ICAP	UG/L				2000	1900	100 U
WM11 MANGANESE	BY ICAP	UG/L				500	490	15 U
WM12 MOLYBDENUM	BY ICAP	UG/L				N/A O	N/A O	N/A O
WM13 NICKEL	BY ICAP	UG/L				480	460	40 U
WM14 LEAD	BY ICAP	UG/L				4800	4900	3.0 U
WM15 ANTIMONY	BY ICAP	UG/L				980	950	60 U
WM16 SELENIUM	BY ICAP	UG/L				53	49	5.0 U
WM17 TITANIUM	BY ICAP	UG/L				N/A O	N/A O	N/A O
WM18 THALLIUM	BY ICAP	UG/L				97	100	10 U
WM19 VANADIUM	BY ICAP	UG/L				490	480	50 U
WM20 ZINC	BY ICAP	UG/L				3100	3100	20 U
WM21 CALCIUM, TOTAL BY ICAP		MG/L				49	50	5.0 U
WM22 MAGNESIUM, TOTAL BY ICAP		MG/L				25	25	5.0 U
WM23 SODIUM, TOTAL BY ICAP		MG/L				50	50	5.0 U
WM24 POTASSIUM, TOTAL BY ICAP		MG/L				49	51	5.0 U
ZZ01 SAMPLE NUMBER		NA	914	914	914	915	915	915
ZZ02 ACTIVITY CODE		NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	916A	916C	916M	917M	918A	918C
SM01 SILVER	BY ICAP	MG/KG				2.0 U	22	23
SM02 ALUMINUM	BY ICAP	MG/KG				40 U	330	320
SM03 ARSENIC	BY ICAP	MG/KG				2.0 U	920	810
SM04 BARIUM	BY ICAP	MG/KG				40 U	40 U	40 U
SM05 BERYLLIUM	BY ICAP	MG/KG				1.0 U	19	18
SM06 CADMIUM	BY ICAP	MG/KG				1.0 U	45	43
SM07 COBALT	BY ICAP	MG/KG				10 U	140	130
SM08 CHROMIUM	BY ICAP	MG/KG				2.0 U	100	94
SM09 COPPER	BY ICAP	MG/KG				5.0 U	6900	6700
SM10 IRON	BY ICAP	MG/KG				20 U	22000	20000
SM11 MANGANESE	BY ICAP	MG/KG				3.0 U	210	200
SM12 MOLYBDENUM	BY ICAP	MG/KG				N/A O	N/A O	N/A O
SM13 NICKEL	BY ICAP	MG/KG				8 0 U	61	55
SM14 LEAD	BY ICAP	MG/KG				1.0 U	240	220
SM15 ANTIMONY	BY ICAP	MG/KG				12 U	210	210
SM16 SELENIUM	BY ICAP	MG/KG				1.0 U	39	41
SM17 TITANIUM	BY ICAP	MG/KG				N/A O	N/A O	N/A O
SM18 THALLIUM	BY ICAP	MG/KG				2.0 U	39	39
SM19 VANADIUM	BY ICAP	MG/KG				10 U	66	67
SM20 ZINC	BY ICAP	MG/KG				4.0 U	190	180
SM21 CALCIUM	BY ICAP	MG/KG				1000 U	200000	180000
SM22 MAGNESIUM	BY ICAP	MG/KG				1000 U	120000	120000
SM23 SODIUM	BY ICAP	MG/KG				1000 U	1000 U	1000 U
SM24 POTASSIUM	BY ICAP	MG/KG				1000 U	1000 U	1000 U
WM35 SILVER,DISSOLVED	BY ICAP	UG/L	500	530	10 U			
WM36 ALUMINUM,DISSOLVED	BY ICAP	UG/L	2000	2100	200 U			

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND	UNITS	916A	916C	916M	917M	918A	918C
WM37 ARSENIC,DISSOLVED BY ICAP	UG/L	47	42	10 U			
WM38 BARIUM,DISSOLVED BY ICAP	UG/L	2000	2100	200 U			
WM39 BERYLLIUM,DISSOLVED BY ICAP	UG/L	480	470	5.0 U			
WM40 CADMIUM,DISSOLVED BY ICAP	UG/L	500	530	5.0 U			
WM41 COBALT,DISSOLVED BY ICAP	UG/L	500	520	50 U			
WM42 CHROMIUM,DISSOLVED BY ICAP	UG/L	510	510	10 U			
WM43 COPPER,DISSOLVED BY ICAP	UG/L	520	530	25 U			
WM44 IRON,DISSOLVED BY ICAP	UG/L	2000	2000	100 U			
WM45 MANGANESE,DISSOLVED BY ICAP	UG/L	500	510	15 U			
WM46 MOLYBDENUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O			
WM47 NICKEL,DISSOLVED BY ICAP	UG/L	480	490	40 U			
WM48 LEAD,DISSOLVED BY ICAP	UG/L	98	95	3.0 U			
WM49 ANTIMONY,DISSOLVED BY ICAP	UG/L	980	1000	60 U			
WM50 SELENIUM,DISSOLVED BY ICAP	UG/L	53	48	5.0 U			
WM51 TITANIUM,DISSOLVED BY ICAP	UG/L	N/A O	N/A O	N/A O			
WM52 THALLIUM,DISSOLVED BY ICAP	UG/L	97	93	10 U			
WM53 VANADIUM,DISSOLVED BY ICAP	UG/L	490	510	50 U			
WM54 ZINC,DISSOLVED BY ICAP	UG/L	3100	3200	20 U			
WM55 CALCIUM,DISSOLVED BY ICAP	MG/L	49	52	5.0 U			
WM56 MAGNESIUM,DISSOLVED BY ICAP	MG/L	25	27	5.0 U			
WM57 SODIUM,DISSOLVED BY ICAP	MG/L	50	51	5.0 U			
WM58 POTASSIUM,DISSOLVED BY ICAP	MG/L	49	53	5.0 U			
ZZ01 SAMPLE NUMBER	NA	916	916	916	917	918	918
ZZ02 ACTIVITY CODE	NA	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR	CSXCR

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: O-CSXCR

COMPOUND		UNITS	919A	919C	920M			
SM01 SILVER	BY ICAP	MG/KG	22	28	2.0 U			
SM02 ALUMINUM	BY ICAP	MG/KG	330	310	40 U			
SM03 ARSENIC	BY ICAP	MG/KG	920	800 J	2.0 U			
SM04 BARIUM	BY ICAP	MG/KG	4.8	40 U	40 U			
SM05 BERYLLIUM	BY ICAP	MG/KG	19	18	1.0 U			
SM06 CADMIUM	BY ICAP	MG/KG	45	44 J	1.0 U			
SM07 COBALT	BY ICAP	MG/KG	140	130 J	10 U			
SM08 CHROMIUM	BY ICAP	MG/KG	100	97	2.0 U			
SM09 COPPER	BY ICAP	MG/KG	6900	6700 J	5.0 U			
SM10 IRON	BY ICAP	MG/KG	22000	21000	20 U			
SM11 MANGANESE	BY ICAP	MG/KG	210	210	3.0 U			
SM12 MOLYBDENUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O			
SM13 NICKEL	BY ICAP	MG/KG	61	59	8.0 U			
SM14 LEAD	BY ICAP	MG/KG	240	230	1.0 U			
SM15 ANTIMONY	BY ICAP	MG/KG	210	220	12 U			
SM16 SELENIUM	BY ICAP	MG/KG	39	40	1.0 U			
SM17 TITANIUM	BY ICAP	MG/KG	N/A O	N/A O	N/A O			
SM18 THALLIUM	BY ICAP	MG/KG	39	46	2.0 U			
SM19 VANADIUM	BY ICAP	MG/KG	66	67	10 U			
SM20 ZINC	BY ICAP	MG/KG	190	190 J	4.0 U			
SM21 CALCIUM	BY ICAP	MG/KG	200000	180000	1000 U			
SM22 MAGNESIUM	BY ICAP	MG/KG	120000	120000	1000 U			
SM23 SODIUM	BY ICAP	MG/KG	50	1000 U	1000 U			
SM24 POTASSIUM	BY ICAP	MG/KG	50	1000 U	1000 U			
ZZ01 SAMPLE NUMBER		NA	919	919	920			
ZZ02 ACTIVITY CODE		NA	CSXCR	CSXCR	CSXCR			

GROUP ANALYSIS SUMMARY

SAMPLE	A	B	PES	D	E	FLD	G	HER	I	MC	BNC	L	MET	N	VC	PES	Q	R	BN	T	U	VOA	HC	X	Y	TRK	COMMENTS
001	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
001 L	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
001 R	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
001 S	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
002	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
003	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
004	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
005	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
006	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
007	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
008	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
009	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
010	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
011	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
012	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
013	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
014	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
015	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
016	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
017	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
018	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
019	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
020	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
021	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
022	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
023	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
024	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
025	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
026	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
027	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
027 L	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
027 R	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
027 S	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
028	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
029	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
030	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
100	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
101	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
102	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
103	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
104	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
105	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
106	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
107	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
108	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
109	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
110	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
111	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
112	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
112 D	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	

GROUP ANALYSIS SUMMARY

SAMPLE:	A	B	PES	D	E	FLD	G	HER	I	MC	BNC	L	MET	N	VC	PES	Q	R	BN	T	U	VOA	HC	X	Y	TRK	COMMENTS
113 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
114 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
115 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
116 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
117 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
118 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
118 L:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
118 R:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
118 S:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
119 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
120 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
200 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
201 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
202 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
203 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
204 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
205 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
206 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
207 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
208 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
208 L:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
208 R:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
208 S:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
209 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
210 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
211 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
212 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
212 D:	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
213 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
214 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
215 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
215 L:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
215 R:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
215 S:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
216 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
217 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
218 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
219 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
219 L:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
219 R:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
219 S:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
220 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
220 L:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
220 R:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
220 S:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
300 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
301 :	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
301 L:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
301 R:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
301 S:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	

GROUP ANALYSIS SUMMARY

SAMPLE	A	B	PES	D	E	FLD	G	HER	I	MC	BNC	L	MET	N	VC	PES	Q	R	BN	T	U	VOA	HC	X	Y	TRK	COMMENTS
302	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
303	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
304	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
305	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
306	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
307	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
308	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
309	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
309 D	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
309 L	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
309 R	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
309 S	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
310	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
311	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
312	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
314	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
315	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
316	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
317	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
318	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
318 L	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
318 R	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
318 S	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
319	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
319 L	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
319 R	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
319 S	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
320 F	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
321 F	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
322 F	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
323 F	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
324	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
324 F	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	2	
325 F	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
400	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
402	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
403	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
403 L	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
404	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
406	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
407	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
408	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
408 L	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
409	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
410	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
411	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
412	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
413	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
414	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
415	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	

GROUP ANALYSIS SUMMARY

SAMPLE:	A	B	PES	D	E	FLD	G	HER	I	MC	BNC	L	MET	N	VC	PES	Q	R	BN	T	U	VOA	HC	X	Y	TRK	COMMENTS
416 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
417 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
418 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
419 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
420 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
421 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
422 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
422 L:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
423 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
424 :	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
424 F:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
425 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
426 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
427 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
428 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
429 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
430 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
431 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
432 :	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
432 F:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
433 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
433 L:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
434 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
435 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
436 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
437 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
438 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
439 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
440 :	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
440 F:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
441 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
442 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
443 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
444 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
445 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
446 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
448 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
449 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	3	
900 M:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
901 R:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
901 S:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
902 A:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
902 C:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
903 M:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
904 R:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
904 S:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
905 A:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
905 C:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
906 M:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
907 A:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	

GROUP ANALYSIS SUMMARY

SAMPLE:	A	B	PES	D	E	FLD	G	HER	I	MC	BNC	L	MET	N	VC	PES	Q	R	BN	T	U	VOA	HC	X	Y	TRK	COMMENTS
907 C:	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	3	
908 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
909 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
909 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
910 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
911 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
911 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
912 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
913 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
913 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
914 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
914 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
914 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
915 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
915 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
915 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
916 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
916 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
916 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
917 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
918 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
918 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
919 A:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
919 C:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
920 M:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	2	
DETERMI-: NATIONS	0	0	0	0	0	123	0	0	0	0	0	0	6548	0	0	0	0	0	0	0	0	0	0	0	0	517	
ANALYSES	0	0	0	0	0	41	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	0	0	225	

ACTIVITY CSXCR BIG RIVER MINE TAILINGS

THE PROJECT LEADER SHOULD CIRCLE ONE - STORET, SAROAD, OR ARCHIVE.

CIRCLE ONE: STORET SAROAD ARCHIVE

DATA APPROVED BY LABO FOR TRANSMISSION TO PROJECT LEADER ON 10/04/90 15:39:22 BY ________

X

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR400		CSXCR402		CSXCR403		CSXCR404	
ALUMINUM	79		90		83		340	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	3.5	
BARIUM	40	U	40	U	40	U	7.9	
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	1.0	U	1.0	U	6.1	
CALCIUM	1000		1300		1000	U	15000	
CHROMIUM	2.0	U	2.0	U	2.1	U	1.8	U
COBALT	10	U	10	U	10	U	10	U
COPPER	97	J	66	J	81	J	44	J
IRON	140		170		120		2600	
LEAD	7.8		19		14		520	
MAGNESIUM	1000	U	1000	U	1000	U	7800	
MANGANESE	9.3		11		6.7		320	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	1.2		1.6		1.5		1.0	U
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	15		20		12		240	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR406		CSXCR407		CSXCR408		CSXCR409	
ALUMINUM	160		67	U	40	U	40	U
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	2.3		1.0	U	1.0	U	1.1	
CALCIUM	1600		1000	U	1000	U	1500	
CHROMIUM	2.1	U	2.0	U	2.0	U	2.0	U
COBALT	10	U	10	U	10	U	10	U
COPPER	150	J	140	J	5.0	U	110	J
IRON	250		120		22		230	
LEAD	62		8.0		1.0	U	32	
MAGNESIUM	1000	U	1000	U	1000	U	1900	
MANGANESE	15		7.0		3.0	U	16	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	1.0	J	1.0	U	1.0	U	1.6	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	44		16		4.0	U	27	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS   MATRIX:AIR   UNITS: UG/SMPL
LAB: SILVER   METHOD: CS0788A   CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW REVIEWER: ________   DATE: 08/20/90
REVIEW LEVEL: 2   DATA FILE : AMC

SAMPLES	CSXCR410		CSXCR411		CSXCR412		CSXCR413	
ALUMINUM	140		160		580		140	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	12	
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	1.1		8.5		1.4	
CALCIUM	2200		2300		24000		1200	
CHROMIUM	2.0	U	2.0	U	2.4	U	2.0	U
COBALT	10	U	10	U	6.5		10	U
COPPER	120	J	83	J	67	J	120	J
IRON	320		430		4300		310	
LEAD	47		57		840		58	
MAGNESIUM	3100		1900		12000		1000	U
MANGANESE	23		33		530		17	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	1.2		1.4		1.0	U	1.7	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	230		1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	2.1		10	U
ZINC	30		36		400		63	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR414		CSXCR415		CSXCR416		CSXCR417	
ALUMINUM	120		58		40	U	200	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	3.2		40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.5		1.0	U	1.0	U	1.5	
CALCIUM	1000	U	1000	U	1000	U	1200	
CHROMIUM	2.0	U	2.0	U	2.0	U	2.0	U
COBALT	10	U	10	U	10	U	10	U
COPPER	100	J	190	J	5.0	U	270	
IRON	190		130		20	U	330	
LEAD	28		21		1.1		14	
MAGNESIUM	260		1000	U	1000	U	1000	U
MANGANESE	11		6.6		3.0	U	22	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	190		1000	U	1000	U	1000	U
SELENIUM	1.2		1.2		1.0	U	1.9	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	250		1000	U	1000	U	1000	
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	3.1	
ZINC	22		24		4.0	U	28	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS   MATRIX:AIR   UNITS: UG/SMPL
LAB: SILVER   METHOD: CS0788A   CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW   REVIEWER: ________   DATE: 08/20/90
REVIEW LEVEL: 2   DATA FILE : AMC

SAMPLES	CSXCR418		CSXCR419		CSXCR420		CSXCR421	
ALUMINUM	230		220		930		150	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	6.0		2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.7		3.0		12		1.0	U
CALCIUM	1400		1900		37000		1600	
CHROMIUM	2.0	U	2.1		2.9		2.0	U
COBALT	10	U	10	U	10	U	10	U
COPPER	110		49		91		110	J
IRON	370		450		6800		360	
LEAD	26		46		1400		130	
MAGNESIUM	1000		1400		18000		1000	U
MANGANESE	25		30		790		24	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10		10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	2.2		2.5		3.5	J	2.0	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	27		37		660		33	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS　MATRIX:AIR　UNITS: UG/SMPL
LAB: SILVER　METHOD: CS0788A　CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW　REVIEWER: ___ST___　DATE: 08/20/90
REVIEW LEVEL: 2　DATA FILE : AMC

SAMPLES	CSXCR422		CSXCR423		CSXCR424		CSXCR425	
ALUMINUM	190		110		40	U	130	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	1.0	U	1.0	U	1.2	
CALCIUM	1100		1000	U	1000	U	1500	
CHROMIUM	2.0	U	2.0	U	2.0	U	2.0	U
COBALT	10	U	10	U	10	U	10	U
COPPER	76	J	220	J	5.0	U	300	J
IRON	310		180		20	U	340	
LEAD	23		8.6		2.7		58	
MAGNESIUM	1000	U	1000	U	1000	U	2300	
MANGANESE	18		10		3.0	U	28	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	2.1		2.0		1.0	U	2.4	J
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	22		36		4.0	U	56	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR426		CSXCR427		CSXCR428		CSXCR429	
ALUMINUM	140		160		610		160	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.4		1.3		9.2		1.0	U
CALCIUM	1400		2500		28000		1100	
CHROMIUM	2.0	U	2.0	U	3.1	U	2.0	U
COBALT	10	U	10	U	10	U	10	U
COPPER	88	J	63	J	66	J	100	J
IRON	330		560		4800		400	
LEAD	70		79		1100		110	
MAGNESIUM	2000		1300		14000		1000	U
MANGANESE	26		53		570		25	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	1.9		2.8		1.0	U	2.5	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	50		53		480		56	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS MATRIX:AIR UNITS: UG/SMPL
LAB: SILVER METHOD: CS0788A CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW REVIEWER: ________ DATE: 08/20/90
REVIEW LEVEL: 2 DATA FILE : AMC

SAMPLES	CSXCR430		CSXCR431		CSXCR432		CSXCR433	
ALUMINUM	160		110		6.9		760	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.4		1.0	U	1.0	U	1.3	
CALCIUM	1000	U	1000	U	1000	U	3700	
CHROMIUM	2.0	U	2.0	U	2.0	U	3.2	
COBALT	10	U	10	U	10	U	10	U
COPPER	98	J	260	J	5.0	U	170	
IRON	250		210		22	U	920	
LEAD	38		14		1.0	U	28	
MAGNESIUM	1000	U	1000	U	1000	U	3100	
MANGANESE	14		10		3.0	U	36	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	2.3		1.6		1.0	U	1.9	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	36	
ZINC	27		29		4.0	U	42	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS   MATRIX:AIR   UNITS: UG/SMPL
LAB: SILVER   METHOD: CS0788A   CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW   REVIEWER: ________   DATE: 08/20/90
REVIEW LEVEL: 2   DATA FILE : AMC

SAMPLES	CSXCR434		CSXCR435		CSXCR436		CSXCR437	
ALUMINUM	840		1000		930		680	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.7		2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	4.7		5.0		1.0	
CALCIUM	3800		18000		13000		2500	
CHROMIUM	2.8		2.7		2.1		2.4	
COBALT	10	U	10	U	10	U	10	U
COPPER	140		130		40		110	
IRON	950		3.9		2600		950	
LEAD	24		290		440		56	
MAGNESIUM	3200		8900		6600		1100	
MANGANESE	36		400		260		39	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	9.3		10	U	10	U
POTASSIUM	1000	U	540		1000	U	1000	U
SELENIUM	3.0	J	3.4	J	1.7	J	1.8	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	37		38		10	U	10	U
ZINC	38		170		240		530	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS   MATRIX:AIR   UNITS: UG/SMPL
LAB: SILVER   METHOD: CS0788A   CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW   REVIEWER: ________   DATE: 08/20/90
REVIEW LEVEL: 2   DATA FILE : AMC

SAMPLES	CSXCR438		CSXCR439		CSXCR440		CSXCR441	
ALUMINUM	720		740		40	U	670	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	1.0	U	1.0	U	1.0	U
CALCIUM	1200		1000	U	1000	U	1500	
CHROMIUM	2.0	U	2.0	U	2.0	U	2.0	U
COBALT	10	U	10	U	10	U	10	U
COPPER	88		240		5.0	U	250	
IRON	820		760		20	U	830	
LEAD	24		17		0.76		29	
MAGNESIUM	440		1000	U	1000	U	1000	U
MANGANESE	23		19		3.0	U	30	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	1.9		1.1		1.0	U	1.7	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	27		31		4.0	U	30	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS MATRIX:AIR UNITS: UG/SMPL
LAB: SILVER METHOD: CS0788A CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW REVIEWER: ________ DATE: 08/20/90
REVIEW LEVEL: 2 DATA FILE : AMC

SAMPLES	CSXCR442		CSXCR443		CSXCR444		CSXCR445	
ALUMINUM	760		720		780		900	
ANTIMONY	12	U	12	U	12	U	12	U
ARSENIC	2.0	U	2.0	U	2.1		2.0	U
BARIUM	40	U	40	U	40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	1.0	U	1.0	U	1.0	
CALCIUM	1500		2200		3500		2300	
CHROMIUM	2.5		2.0	U	3.1		2.2	
COBALT	10	U	10	U	10	U	10	U
COPPER	56		81		43		86	
IRON	890		980		1200		1200	
LEAD	15		24		170		59	
MAGNESIUM	1000	U	1000	U	1500		1000	U
MANGANESE	30		49		67		49	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U	1000	U
SELENIUM	2.2		2.2		2.0		1.9	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U	10	U
ZINC	23		27		50		64	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS MATRIX:AIR UNITS: UG/SMPL
LAB: SILVER METHOD: CS0788A CASE: 5558G
SAMPLE PREP: _______ ANALYST/ENTRY: DEW REVIEWER: ______ DATE: 08/20/90
REVIEW LEVEL: 2 DATA FILE : AMC

SAMPLES	CSXCR446		CSXCR448		CSXCR449	
ALUMINUM	760		820		40	U
ANTIMONY	12	U	12	U	12	U
ARSENIC	2.0	U	2.4		2.0	U
BARIUM	11		40	U	40	U
BERYLLIUM	1.0	U	1.0	U	1.0	U
CADMIUM	1.0	U	7.3		1.0	U
CALCIUM	1500		1500		1000	U
CHROMIUM	2.1		2.3		2.0	U
COBALT	10	U	10	U	10	U
COPPER	64		140		5.0	U
IRON	890		950		40	
LEAD	34		76		1.4	
MAGNESIUM	1000	U	1000	U	1000	U
MANGANESE	32		32		3.0	U
MERCURY	N/A	O	N/A	O	N/A	O
NICKEL	10	U	10	U	10	U
POTASSIUM	1000	U	1000	U	1000	U
SELENIUM	1.5		1.8		1.0	U
SILVER	2.0	U	2.0	U	2.0	U
SODIUM	1000	U	1000	U	1000	U
THALLIUM	2.0	U	2.0	U	2.0	U
VANADIUM	10	U	10	U	10	U
ZINC	25		62		4.0	U
CYANIDE	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR403L		CSXCR408L		CSXCR422L		CSXCR433L	
ALUMINUM	81		N/A	O	180		740	
ANTIMONY	12	U	N/A	O	12	U	12	U
ARSENIC	N/A	O	2.0	U	2.0	U	2.0	U
BARIUM	40	U	N/A	O	40	U	40	U
BERYLLIUM	1.0	U	N/A	O	1.0	U	1.0	U
CADMIUM	1.0	U	N/A	O	1.0	U	1.1	
CALCIUM	1000	U	N/A	O	1100		3600	
CHROMIUM	2.0	U	N/A	O	2.0	U	3.5	
COBALT	10	U	N/A	O	10	U	10	U
COPPER	80		N/A	O	75		160	
IRON	120		N/A	O	310		900	
LEAD	16		1.0		31		34	
MAGNESIUM	1000	U	N/A	O	1000	U	3000	
MANGANESE	6.0		N/A	O	18		35	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	N/A	O	10	U	10	U
POTASSIUM	1000	U	N/A	O	1000	U	1000	U
SELENIUM	N/A	O	1.0	U	2.1		1.9	
SILVER	2.0	U	N/A	O	2.0	U	2.0	U
SODIUM	1000	U	N/A	O	1000	U	1000	U
THALLIUM	N/A	O	2.0	U	N/A	O	2.0	U
VANADIUM	10	U	N/A	O	10	U	34	
ZINC	12		N/A	O	21		41	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR907C	
ALUMINUM	310	
ANTIMONY	230	
ARSENIC	1000	
BARIUM	40	U
BERYLLIUM	18	
CADMIUM	46	
CALCIUM	190000	
CHROMIUM	100	
COBALT	130	
COPPER	6800	
IRON	210	
LEAD	230	
MAGNESIUM	120000	
MANGANESE	210	
MERCURY	N/A	O
NICKEL	55	
POTASSIUM	1000	U
SELENIUM	45	
SILVER	27	
SODIUM	1000	U
THALLIUM	39	
VANADIUM	67	
ZINC	190	
CYANIDE	N/A	O
MOLYBDENUM	N/A	O
TITANIUM	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR900M		CSXCR901R		CSXCR901S		CSXCR902A	
ALUMINUM	40	U	N/A	O	N/A	O	320	
ANTIMONY	12	U	100		95		210	
ARSENIC	2.0	U	8.0		7.8		920	
BARIUM	40	U	400		420		4.8	
BERYLLIUM	1.0	U	10		9.9		19	
CADMIUM	1.0	U	10		11		45	
CALCIUM	1000	U	N/A	O	N/A	O	200000	
CHROMIUM	2.0	U	40		44		100	
COBALT	10	U	100		110		140	
COPPER	5.0	U	50		56		6900	
IRON	20	U	N/A	O	N/A	O	22000	
LEAD	1.0	U	100		110		240	
MAGNESIUM	1000	U	N/A	O	N/A	O	120000	
MANGANESE	3.0	U	100		110		210	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	10	U	100		110		61	
POTASSIUM	1000	U	N/A	O	N/A	O	50000	
SELENIUM	1.0	U	2.0		2.1		39	
SILVER	2.0	U	10		11		22	
SODIUM	1000	U	N/A	O	N/A	O	50000	
THALLIUM	2.0	U	10		12		39	
VANADIUM	10	U	100		110		66	
ZINC	4.0	U	100		110		190	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS MATRIX:AIR UNITS: UG/SMPL
LAB: SILVER METHOD: CS0788A CASE: 5558G
SAMPLE PREP: ________ ANALYST/ENTRY: DEW REVIEWER: ________ DATE: 08/20/90
REVIEW LEVEL: 2 DATA FILE : AMC

SAMPLES	CSXCR902C		CSXCR903M		CSXCR904R		CSXCR904S	
ALUMINUM	310		40	U	N/A	O	N/A	O
ANTIMONY	230		12	U	100		100	
ARSENIC	1000		2.0	U	8.0		8.2	
BARIUM	40	U	40	U	400		420	
BERYLLIUM	18		1.0	U	10		9.6	
CADMIUM	47		1.0	U	10		12	
CALCIUM	180		1000	U	N/A	O	N/A	O
CHROMIUM	95		2.0	U	40		42	
COBALT	130		10	U	100		100	
COPPER	6700		5.0	U	50		58	
IRON	210		20	U	N/A	O	N/A	O
LEAD	240		1.0	U	100		110	
MAGNESIUM	120		1000	U	N/A	O	N/A	O
MANGANESE	200		3.0	U	100		100	
MERCURY	N/A	O	N/A	O	N/A	O	N/A	O
NICKEL	60		10	U	100		100	
POTASSIUM	1000	U	1000	U	N/A	O	N/A	O
SELENIUM	41		1.0	U	2.0		2.4	
SILVER	27		2.0	U	10		11	
SODIUM	1000	U	1000	U	N/A	O	N/A	O
THALLIUM	48		2.0	U	10		9.8	
VANADIUM	66		10	U	100		100	
ZINC	190		4.0	U	100		100	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

ANALYSIS TYPE: METALS, TOTAL

TITLE: BIG RIVER MINE TAILINGS
LAB: SILVER
SAMPLE PREP: ________ ANALYST/ENTRY: DEW
REVIEW LEVEL: 2

MATRIX:AIR
METHOD: CS0788A
REVIEWER: ________
DATA FILE : AMC

UNITS: UG/SMPL
CASE: 5558G
DATE: 08/20/90

SAMPLES	CSXCR905A		CSXCR905C		CSXCR906M		CSXCR907A	
ALUMINUM	320		300		40	U	320	
ANTIMONY	210		220		12	U	210	
ARSENIC	920		1100		2.0	U	920	
BARIUM	4.8		40	U	40	U	4.8	
BERYLLIUM	19		17		1.0	U	19	
CADMIUM	45		45		1.0	U	45	
CALCIUM	200000		180000		1000	U	200000	
CHROMIUM	100		93		2.0	U	100	
COBALT	140		130		10	U	140	
COPPER	6900		6600		5.0	U	6.9	
IRON	22000		21000		20	U	22	
LEAD	240		220		1.0	U	240	
MAGNESIUM	120000		120000		1000	U	120000	
MANGANESE	210		200		3.0	U	210	
MERCURY	N/A	O	N/A	O	0.10	U	N/A	O
NICKEL	61		60		10	U	61	
POTASSIUM	50000		1000	U	1000	U	50	
SELENIUM	39		32		1.0	U	39	
SILVER	22		26		2.0	U	22	
SODIUM	50000		1000	U	1000	U	50	
THALLIUM	39		45		2.0	U	39	
VANADIUM	66		64		10	U	66	
ZINC	190		190		4.0	U	190	
CYANIDE	N/A	O	N/A	O	N/A	O	N/A	O
MOLYBDENUM	N/A	O	N/A	O	N/A	O	N/A	O
TITANIUM	N/A	O	N/A	O	N/A	O	N/A	O

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: DOXC9 SAMNO: 002 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SOIL) DATE TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 23/90 15:20 EAST: ___
CASE/BATCH/SMO: ______/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings Sample collected near center of the tailings pile.
Sample Location 002 on map.

SAMPLE COLLECTED BY : Roberts/Silva

RAPT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 003 QCC: _ MEDIA: SOIL PL: S P F O

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SOIL) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 15:20 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
TORET/SARDAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings Sample collected along south west edge of tailings pile ~100 ft from deep gully. Sample Location 003 on map.

SAMPLE COLLECTED BY : Roberts / Silva

DRAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 004 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SOIL) DATE TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~24~~ 25/90 15:30 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: __ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings sample collected along North west edge of tailings pile, ~~at~~ ~20 ft from edge of pond of water standing on tailings. Sample Location 004 on map.

SAMPLE COLLECTED BY : Silva / Roberts

DRAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: DSXCP SAMNO: 005 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SOIL) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 15:50 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings sample collected along north edge of tailings pile ~150 feet east of road access to north end of pile. Sample location ØØ5 on map.

SAMPLE COLLECTED BY : Roberts / Silva

LM

RAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: DOXCR SAMNO: 006 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS
LOCATION: DESLOGE MO PROJECT NUM: 433
REF PT: LATITUDE: __ __ __ LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL)
LOCATION: DESLOGE MO
CASE/BATCH/SMO: _____/_/_____ LAB: ___
STORET/SAROAD NO: _____

DATE TIME
BEG: 07/24/90 16:00
END: __/__/__ __:__

FROM REF PT
EAST: ___
NORTH: ___
DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings sample collected ~150 ft west of Hi-Vol air sampler #3 along northeast margin of tailings pile. Sample location 006 on field map.

SAMPLE COLLECTED BY : Silva / Roberts

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 007 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME , FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 16:25 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings sample collected along east margin of pile, along base of washed-out area. Sample location ØØ7.

SAMPLE COLLECTED BY : Silva / Roberts

RAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: GSXCR SAMNO: 008 QCC: _ MEDIA: SOIL PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:__ __ __

AMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE 24 TIME FROM REF PT
OCATION: DESLOGE MO BEG: 07/27/90 16:25 EAST: ___
ASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___
TORET/SAROAD NO: _____ DOWN: 0-6"

NALYSIS REQUESTED:

ONTAINER	COLOR	PRESERVATIVE	MGP	NAME
LASS	WHITE	ICED	SM	METALS

OMMENTS: Duplicate of 007.

AMPLE COLLECTED BY : Silva/Roberts

PAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: PC ACTNO: CSXCP SAMNO: 009 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME. FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 16:40 EAST: ____
CASE/BATCH/SMO: ____/_/____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings sample collected near central "neck" of the tailings pile. Sample location ∅∅4 on field map.

~ 100 feet east of meteorological station.

SAMPLE COLLECTED BY : Roberts / Silva

?AFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 010 QCC: _ MEDIA: SOIL PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
OCATION: DESLOGE MO PROJECT NUM: A33 PT; LONGITUDE: ___ __ __

AMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME: FROM REF PT
OCATION: DESLOGE MO BEG: 07/27/90 11:20 EAST: ____
ASF/BATCH/SNO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
TORET/SARDAS NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:
CONTAINER COLOR PRESERVATIVE MGP NAME
O FIELD SHEET FILE INFORMATION AVAILABLE - ~~CONSULT SYSTEM MANAGER~~ Metals

COMMENTS: Tailings sample collected on southeast section of tailings pile, sample location 010 on field map.

KEA GROUP M

SAMPLE COLLECTED BY : W. McCall Roberts

PART   FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 011 QC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS   REF LATITUDE: __ __ __
LOCATION: DESLOGE   MO PROJECT NUM: A33   PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL)   DATE   TIME   FROM REF PT
LOCATION: DESLOGE   MO   BEG: 07/25/90 13:30   EAST: ____
CASE/BATCH/SMO: _____/_/______   LAB: ___   END: __/__/__ __:__   NORTH: ____
STORET/SAROAD NO: ______   DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Tailings sample collected at Hi-Vol sampler #4 ~ 75 feet north of the Land fill office.

SAMPLE COLLECTED BY : Robert Silvey

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 012 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE 25 my TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 14:25 EAST: ___
CASE/BATCH/SMO: ____/_/____ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Background soil sample collected at B-161 location 007 on the Lee Glore property. Soil sample location 012 on field maps.

SAMPLE COLLECTED BY : Roberts / Silva

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: GSXCR SAMNO: 013 QCC: _ MEDIA: SOIL PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

AMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME FROM REF PT

OCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 14:35 EAST: ___

ASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___

TORET/SAROAD ID: _____ DOWN: 0-6"

NALYSIS REQUESTED:

ONTAINER	COLOR	PRESERVATIVE	MGP	NAME
LASS	WHITE	ICED	SM	METALS

OMMENTS: Soil sample collected at Hi-Vol location AMØ6, Pratt property. Collected ~25 feet south of Hi-Vol unit.

AMPLE COLLECTED BY : Roberts / Silva

PAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: ?? ACTNO: CJXCR SAMNO: 014 QCC: _ MEDIA: SOIL PL: S P F C

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

AMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME. FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~24~~ 25/90 15:10 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
TORET/SARGAD NO: ______ DOWN: 0-6 inch

NALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Soil sample collected at Hi-Vol Sampler location AMØ5, Callahan property. Sample collected along fence ~ 4 feet West ~~North~~ of the Hi-Vol unit.

SAMPLE COLLECTED BY : Silva / Roberts

MJ

DAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: COXCR SAMNO: 015 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS
LOCATION: DESLOGE MO PROJECT NUM: A33
REF LATITUDE: __ __ __
PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL)
LOCATION: DESLOGE MO
CASE/BATCH/SMO: _____/_/_____ LAB: ___
STORET/SAROAD NO: _____

DATE TIME
BEG: 07/~~27~~ 25/90 15:35
END: __/__/__ __:__

FROM REF PT
EAST: ___
NORTH: ___
DOWN: 0-6 inch

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Soil Sample collected at Hi-Vol Samplers locations AM01 & AM02, H. Wood property. Sample collected ~ 20 feet west of Hi-Vol samplers.

SAMPLE COLLECTED BY : McCall / Silva

PR

3 page/pages has/have been removed for confidentiality reasons.

17

DAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: G5XC3 SAMNO: 019 QCC: _ MEDIA: SOIL PL: D P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/26/90 16:25 EAST: ____
CASE/BATCH/SMO: ______/_/______ LAB: ___ END: __/__/__ __:__ NORTH: __
STORET/SAROAD NO: ______ DOWN: 0-6

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Duplicate of 018.

SAMPLE COLLECTED BY : Silva / McCall

1 page/pages has/have been removed for confidentiality reasons.

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C3XCR SAMNO: 021 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 ~~17:00~~ EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: ~~0-6"~~

1415 hours 0-3" SPM

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: ~~Soil sample in residential yard.~~ ~~Residence located well off of road at at end of gravel access road.~~ MM 7/26/90

Leachate Seep area

South of landfill and well DG-3

SAMPLE COLLECTED BY : Martin Enos

5 page/pages has/have been removed for confidentiality reasons.

DAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXC3 SAMNO: 027 QCC: _ MEDIA: SOIL PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME* FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 09:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 5-6 ft

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Onsite boring collected near met station from 5-6 ft depth

SAMPLE COLLECTED BY : Williams + Overfelt

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 028 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME / FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 09:30 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 10-11 ft

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: On site boring collected near met station
Taken from 10-11 ft depth

SAMPLE COLLECTED BY : Overfelt + Williams

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXC? SAMNO: 029 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SOIL) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 10:30 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SARDAD NO: ______ DOWN: 15-16'

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

On site boring collected near met station from 15 to 16 foot depth

SAMPLE COLLECTED BY : William, T Overfelt

1 page/pages has/have been removed for confidentiality reasons.

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: DSXC8 SAMNO: 100 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 23/90 10:00 EAST: ___

CASE/BATCH/SMC: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SARROAD ID: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Most upgradient, near Irondale

SAMPLE COLLECTED BY : Williams / Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 101 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 13:15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
TORET/SARGAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Collected Approx 3/4 mile downgradient of Hwy 8 bridge on Big River.

SAMPLE COLLECTED BY : Williams + Martin

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCP SAMNO: 102 QCC: _ MEDIA: SOIL PL: S P F O

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 15:45 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARDAD NO: ______ DOWN: 0-3"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Collected from Leadwood tailings pile tributary to Big River

SAMPLE COLLECTED BY : Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 103 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME • FROM REF PT

LOCATION: DESLOGE MO BEG: 07/23/90 16:20 EAST: ___

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SAROAD NO: _____ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Collected on Big River Approx 1/2 mile downgradient of the Leadwood access

SAMPLE COLLECTED BY : Williams + Enos

?AFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: ?0 ACTNO: CSXCR SAMNO: 104 QCC: _ MEDIA: SOIL PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

.OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

AMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME, FROM REF PT

.OCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 09:00 EAST: ____

ASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: __.__

TORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
LASS	WHITE	ICED	SM	METALS

COMMENTS:

Big River; 1st sample downstream of low water bridge on west side of site.

AMPLE COLLECTED BY : Williams/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 105 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~21~~ 24/90 10:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARCAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Big River; 2nd sample downstream of low water bridge on west side of site.

SAMPLE COLLECTED BY : Williams/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 106 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME, FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 10:30 EAST: ___

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: .

STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Big River; swimming area west side of site.

SAMPLE COLLECTED BY : Williams/Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 107 QCC: _ MEDIA: SOIL PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

AMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT
OCATION: DESLOGE MO BEG: 07/27/90 13:15 EAST: ___
ASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
TORET/SAROAD NO: ______ DOWN: 0-6"

NALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
LASS	WHITE	ICED	SM	METALS

OMMENTS:

Location # 7 on field map

AMPLE COLLECTED BY : Overfelt & Williams

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 108 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 19:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Location # 8 on field map

SAMPLE COLLECTED BY : Overfelt & Williams

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: ~~110~~ 109 5PA QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 14:45 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Location # 9 on field map

SAMPLE COLLECTED BY : Overfelt + Williams

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: ~~107~~ 116 SPH QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~24/90 13:15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ~~0-6"~~ 0-3" SPM

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Owl Creek, north of abandoned RR bed

SAMPLE COLLECTED BY : Martin/Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

TY: 90 ACTNO: CSX07 SAMNO: 111 QCC: _ MEDIA: SOIL PL: S P F O

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:__ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE 24 TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 14:15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ~~0-6~~ 0-3"

SPM

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Owl Creek, ≈ 30' upstream of mouth

Collected w/ spoon

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

TY: 90 ACTNO: CSXCR SAMNO: 112 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE: TIME: FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/93 15:30 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___.
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Big River Location: North of St Joe Property, Location on Field Map, Location # 12

SAMPLE COLLECTED BY : Martin/Williams

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: ~~125~~ 112D ~~GS~~ QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 5:30 EAST: ____
CASE/BATCH/SMC: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARCAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:
CONTAINER COLOR PRESERVATIVE MGP NAME
NO FIELD SHEET FILE INFORMATION AVAILABLE ~~CONSULT SYSTEM MANAGER~~ Metals

COMMENTS: Big River Location: North of St. Joe Property, see field map, Location #12

SAMPLE COLLECTED BY : Martin / Williams________

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 113 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 16:30 EAST: ___

CASE/BATCH/SMO: ______/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Big River , East of Site , Location on Field Map

Location #13

SAMPLE COLLECTED BY : Martin/Williams__________

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C5XCR SAMNO: 114 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) 25 TIME ' FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 9:15 EAST: ___
CASE/BATCH/SMC: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: .
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Location #14 on field map

SAMPLE COLLECTED BY : Williams & Enos

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXC9 SAMNO: 115 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS SITE(SEDIMENT) DATE TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/25/90 10:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Collected from Flat River Creek.
Location #15 on field map.

SAMPLE COLLECTED BY : Williams & Enos

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 116 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SEDIMENT) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 11:30 EAST: ___

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Collected on Big River approx. 5 miles downgradient of the site. Location #16 on field map

SAMPLE COLLECTED BY : Williams + Marton

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 117 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SEDIMENT) DATE, TIME, FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 14:30 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SARDAO NO: ______ DOWN: ~~0-6~~ 0-3" SPM

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS:

Turkey Creek, ≈ 30' from rd.

SAMPLE COLLECTED BY : ____Enos______________

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCP SAMNO: 116 QCC: _ MEDIA: SOIL PL: S P F O

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/25/90 14:30 EAST: ___
CASE/BATCH/SMC: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SARCAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Location 18 on field map

SAMPLE COLLECTED BY : Williams & Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 119 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SEDIMENT) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/25/90 15:30 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Location # 19 on field map

SAMPLE COLLECTED BY : Williams + Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: DSXCR SAMNO: 120 QCC: _ MEDIA: SOIL PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SEDIMENT) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 18:15 EAST: ___

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SAROAD NO: ______ DOWN: 0-6"

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
GLASS	WHITE	ICED	SM	METALS

COMMENTS: Location # 20 on Field map

SAMPLE COLLECTED BY : Williams + Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: DSXCR SAMNO: 200 QCC: _ MEDIA: WATER PL: S P F O

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 23/90 10:00 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	WO7	IH DISSOLVED METALS

COMMENTS:

Most upgradient sample, near Irondale

pH 6.96.
T° 24°C.
Cond - 170 µmhos.

SAMPLE COLLECTED BY : Williams / Enos

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 201 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 13:15 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SARGAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Collected Approx. 3/4 mile downgradient of Hwy 8 bridge on Big River

pH - 7.23.

Cond - ~~[illegible]~~ SM 170 µmhos.

Temp - 27°C.

SAMPLE COLLECTED BY : Williams & Martin

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C3XCR SAMNO: 202 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME *FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 23/90 15:45 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Collected from Leadwood tailings pile
Tributary to Big River

pH – 7.20

Temp 26°C

cond – 550 μmhos

SAMPLE COLLECTED BY : Martin

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 203 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME • FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 16:20 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Collected on Big River Approx. ½ mile downgradient of the Leadwood access

pH – 7.48

Temp – 25°C

Cond – 200 μmhos

SAMPLE COLLECTED BY : Williams + Enos

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 204 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE ~~27~~ 24 TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 09:00 EAST: ___
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SARCAD NO: ______ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
- OZ PLASTIC	GREY	FILTER, HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Big River; 1st sample downstream of low water bridge on west side of site.

pH = 7.27.
cond = 290.
T° = 23°C.

SAMPLE COLLECTED BY : Williams/Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXC3 SAMNO: 205 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 10:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Big River, 2nd sample downstream of low water bridge on west side of site.

pH = 7.63
cond = 280
T° = ~~22°~~ 5pm 23°C

SAMPLE COLLECTED BY : Williams/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 206 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE, TIME, FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 29/90 10:30 EAST: ___

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SAROAD NO: _____ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Big River; swimming area west side of site

pH = 7.42

T° = 25°C

cond = 260

SAMPLE COLLECTED BY : Williams/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 207 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 ~~13:45~~ 13:25 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARDAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Location # 7 on the field map

pH - ~~6.73~~ 7.33 RO

Temp - 28°C

Cond - 380 μmhos

SAMPLE COLLECTED BY : Williams + Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 208 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 14:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARDAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Location #8 on field map

pH - 7.44

Cond - 360

Temp - 29°C

SAMPLE COLLECTED BY : Williams + Overfelt

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 209 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 14:45 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Location # 9 on field map

pH - 7.45

Cond - 370 μmhos

Temp - 29°C

SAMPLE COLLECTED BY : Overfelt/Williams

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C3XCR SAMNO: 210 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 13:15 EAST: ____
CASE/BATCH/SMC: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARGAD NO: ______ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Owl Creek; north of abandoned RR bed

pH = 7.33
cond = 550
T° = 18.5°C

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 211 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE 24 TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 14:15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Owl Creek ≈ 30' upstream of mouth

cond = 245
pH = 7.60
T° = 26°C

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 212 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 15:30 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER, HNO3	W07	IH DISSOLVED METALS

COMMENTS: Big River Location: North of St Joe Property Location on field map

Location #12

Cond. 290.
ph 7.29.
Temp 25°C

SAMPLE COLLECTED BY : Martin/ Williams

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

212 OCE

FY: 90 ACTNO: CSXCR SAMNO: ~~205~~ QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~2~~ 24/90 15:30 EAST: ____

CASE/BATCH/SMC: ______/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED: add metals - mz

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
1 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Big River, North of St Joe Property (Duplicate) Location on field map

Location #12

SAMPLE COLLECTED BY : Martin / Williams

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C3XCR SAMNO: 213 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE & TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 16:30 EAST: ___
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___
TORET/SAROAD NO: ______ DOWN: ___

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Big River East of Site, Location on field Map

Cond. 290. Location #13

ph 7.55.

temp. 26°..

SAMPLE COLLECTED BY : Williams / Martin

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C3XCR SAMNO: 214 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 ~~09:45~~ 9:15 EAST: ____

CASE/BATCH/SMO: ______/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
- OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Location #14 on field map.

pH - 7.31

Cond - 350 µmhos

Temp - 23°C

SAMPLE COLLECTED BY : Williams + Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 215 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) 025 TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/25/90 10:00 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SARGAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	WO7	IH DISSOLVED METALS

COMMENTS: Collected from Flat River Creek upgradient of Big River confluence. Location #15 on field map.

pH - 8.0

Cond - 550 µmhos

Temp - 23°C

SAMPLE COLLECTED BY : Williams & Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 216 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 11:30 EAST: ____

CASE/BATCH/SMO: ______/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Collected on Big River approx. 5 miles downgradient of the site. Location #16 on field map.

pH - 7.26

Cond - 340 μmhos

Temp - 27°C

SAMPLE COLLECTED BY : William F Martin

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 217 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE, TIME, FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 14:30 EAST: ____

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: Surface

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Turkey Creek; off road ≈ 30 feet

pH = 7.58

T° = 23°C

cond = 650

SAMPLE COLLECTED BY : ___Martin___________

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 218 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) ~~D2E~~ TIME. FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~/90 14:30 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Location # ~~4~~18 on field ~~[illegible]~~ map

pH - 7.34

Cond - 205

Temp - 27°C

SAMPLE COLLECTED BY : Williams + Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 219 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/26/90 15:30 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SARGAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Location #19 on fieldmap

Cond - 315

pH - 7.46

Temp - 25°C

SAMPLE COLLECTED BY : Williams + Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 220 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DAYS TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 12:15 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Location # 20 on field map

Cond - 310 umhos

pH - 7.4

Temp - 26°C

SAMPLE COLLECTED BY : Williams & Enos

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 300 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 09:00 EAST: ____

CASE/BATCH/SMC: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Spring #1; first one downstream of low water bridge on west side of site; spring coming out of tailings

pH = 7.38.
T° = 22°C.
cond. = 600.

SAMPLE COLLECTED BY : Williams/Enos

6

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 301 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 12:50 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ?

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
1 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Arteston well (south)
± 50' north of center line of abandoned RR bed

pH = 7.16
T°C = 17°C
cond = 550

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 302 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME • FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 14:15 EAST: ___
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: _____ DOWN: ___

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Location Spring # 2 on field map.

pH - 7.25

Cond - 600 µmhos

Temp - 28°C

SAMPLE COLLECTED BY : Overfelt

DRAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 303 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~24~~ 25/90 15:~~30~~ 15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Location # Spring # 3

pH - 7.07

Cond - 1100 umhos

Temp - 28°C

SAMPLE COLLECTED BY : Overfelt

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 304 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/24/90 16:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
+ OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Big River Spring #4 between 212 + 213
Location on Field map

Cond. 600 micro ~~moles~~ mhos
Ph 7.57
temp. 25°c

SAMPLE COLLECTED BY : Williams | Martin

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 305 QCC: _ MEDIA: WATER PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

AMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

OCATION: DESLOGE MO BEG: 07/2?/90 8:45 EAST: ____

ASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

TORET/SAROAD NO: ______ DOWN: ____

NALYSIS REQUESTED:

ONTAINER	COLOR	PRESERVATIVE	MGP	NAME
UBI	WHITE	5 ML HNO3	WM	METALS
OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

OMMENTS: Location is Spring # 5 on field map.

pH - 10.62

Cond - 2100

Temp - 21°C

AMPLE COLLECTED BY : Williams + Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 306 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE:__ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE 25 TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 14:15 CT: ___ ← 100) DGJ 8/3/9
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: ______ DOWN: ~~263~~ 216 feet

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Leachate Seep Area -- south of well DG-3.

pH = 7.39

T° = 25°C

cond = 1400 ~~mm~~ SIM umhos

7/26/90

SAMPLE COLLECTED BY : Martin/Enos

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXC? SAMNO: 307 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:__ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 16:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
TORET/SARDAD NO: ______ DOWN: ___

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Landfill Well

pH = 6.92

cond = 550

T° = 17°C

SAMPLE COLLECTED BY : Martin/Enos

1 page/pages has/have been removed for confidentiality reasons.

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 309 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE 27 TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 08:15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/SPH__:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 10.75

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER, HNO3	W07	IH DISSOLVED METALS

COMMENTS: DG-5 Depth 10.75
monitor Well

pH = 6.56.
cond = 1400.
T° = 18°C.

Water has little sediment both on sampling and on purging.

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: ~~313~~ 309 D QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~21~~ 26/90 08:15 EAST: ____

CASE/BATCH/SMC: _____/_/______ LAB: ___ END: __/__ 27 5PM __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: 10.75

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: DC-5 Monitor Well Depth 10.75 feet

Duplicate of 309

SAMPLE COLLECTED BY : Martin / Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 310 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~23~~ 26/90 08:45 EAST: ___

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/27 1 PM __:__ NORTH: .

STORET/SAPOAD NO: ______ DOWN: 37.5

DGJ 8/3/90

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	HM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Ug 1 37.5 feet
Monitor well

pH = 6.78
cond = 900
T° = 15°C

Water is clear
on sampling.
Very rusty to somewhat
rusty on purging.

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 311 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/21/90 09:35 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 45

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER, HNO3	W07	IH DISSOLVED METALS

COMMENTS: Moniter Well D6-3 Well depth 45 feet

pH = 6.56
cond = 1100
T° = 17°C

Rusty water, both on purging and Sampling.
Only ≈ 200 ml on sampling; so split between 2 samples

SAMPLE COLLECTED BY : Martin / Enos

DRAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCP SAMNO: 312 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/26/90 09:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: 30.5

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
- OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Monitor Well DG-2 Well depth 30.5 feet

pH = 6.45
T° = 16°C
cond = 700

Fair amount of sediment both sampling & esp. purging

SAMPLE COLLECTED BY : Martin / Enos

DRAFT

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 314 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~24~~ 26/90 16:30 EAST: ___
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SAROAD NO: _____ DOWN: 7 ft

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Location ~~mine~~ Rd Temporary well #1 on field map

pH - 7.15
Cond - 470
Temp - 25°C

SAMPLE COLLECTED BY : Overfelt / Williams

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXC3 SAMNO: 315 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 11:50 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
TORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
- OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Tempory well sample collected on NW side of tailings pile. Location miniwell #2 on field map

water table 9 ft
well depth 12 ft

pH - 7.05
Cond - 420 µmhos
Temp - 25°C

SAMPLE COLLECTED BY : Williams & Overfelt

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 316 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 15:00 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Temporary well sample collected on N end of tailings pile. Location is miniwell #3 on field map

pH - 6.93.

Cond - 600 μmhos.

Temp - 20°C.

SAMPLE COLLECTED BY : Overfelt & Williams

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C5XCR SAMNO: 317 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE 1645 FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 ~~16:00~~ EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER/HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Temporary well sample collected near Wi-Vol #3. Location mini-well #4 on field map.

Depth - 12 ft

water level - 9 ft

pH - 7.11.

Cond - 700 µmhos.

Temp - 20°C.

SAMPLE COLLECTED BY : Overfelt / Williams

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 313 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 15:20 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
8 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Bkg. Spring -- north side of Big River in Bone Hole Area

pH = 7.04

cond = 550 umhos

T = 17°C

SAMPLE COLLECTED BY : Martin/Enos

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 019 QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 15:45 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

North end of tunnel under site; Bone Hole Area

pH = 7.54
cond = 650 umhos
T = 19°C

SAMPLE COLLECTED BY : Martin/Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 320F QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 14:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___
STORET/SARCAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
~~1 QT PLASTIC~~	~~GREY~~	~~FILTER,HNO3~~	~~WO7~~	~~IM DISSOLVED METALS~~ SPM 7/27/90

COMMENTS:

Trip Blank
Preserved at lab
Total Metals only

SAMPLE COLLECTED BY : Martin

FAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV., 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 321F QC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 14:05 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Field Blank

Prepared & Preserved in field

SAMPLE COLLECTED BY : ___Enos_______________

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV., 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 322F QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 14:10 EAST: ___

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ___

STORET/SAROAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Field Blank (prepared same as 321F)

SAMPLE COLLECTED BY : Enos

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCP SAMNO: 323F QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME X FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 14:15 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
STORET/SAROAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
4 OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

Rinsate of disposable teflon bailers used for sampling

SAMPLE COLLECTED BY : Martin

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: ~~321~~ 324 SWA QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(SURFACE WATER) DATE TIME* FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 7:30 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SARCAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
. OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS: Collected from effluent pipe at confluence of Owl Creek and Big River. (Artesion well actually)

Cond — 730 µmhos.

pH — 7.10.

Temp — 15°C.

SAMPLE COLLECTED BY : Martin

PART FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCP SAMNO: ~~324~~ 324F QCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 14:30 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____

STORET/SAROAD NO: ______ DOWN: NA

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
OZ PLASTIC	GREY	FILTER,HNO3	W07	IH DISSOLVED METALS

COMMENTS:

#324F

Rinsate of Geoprobe Pipe

SAMPLE COLLECTED BY : Martin

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTID: CSXCR SAMNO: 025FQCC: _ MEDIA: WATER PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS(GROUND WATER) DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 15:30 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: __/__/__ __:__ NORTH: ____
TORET/SARGAD NO: ______ DOWN: ____

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
CUBI	WHITE	5 ML HNO3	WM	METALS
~~QT PLASTIC~~	~~GREY~~	~~FILTER, HNO3~~	~~WO7~~	~~IH DISSOLVED METALS~~

SBM
7-27-90

COMMENTS:

Acid Blank, prepared at motel
Total Metals only

SAMPLE COLLECTED BY : Martin

1 page/pages has/have been removed for confidentiality reasons.

DRAFT

FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCF SAMNO: 402 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 23 /90 12:47 EAST: ___
CASE/BATCH/SMC: _____/_/______ LAB: ___ END: 07/24/90 1:00 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:47 ON: 11814.0
FLOW INDICATOR: ON: 12.42 OFF: 1.00 OFF: 1:00 OFF: 12554.6

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AMOT~~	PARTICULATE ~~LEAD~~ TOTAL METALS PR IN AIR BY

MR 8/09/90

COMMENTS: BR-AM-ØZ-1

Collocated sample, location: Howard Wood property. Approximately 500 feet east of the Big River site, from the east side of the tailing piles.

SAMPLE COLLECTED BY: Roberts / Silva / McCall

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 403 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/~~27~~/~~90~~ 23:40 NORTH: ____
STORET/SAROAD NO: ______ 23 P.R. DOWN: ____

23 PR

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 3138.5
FLOW INDICATOR: ON: 12.00 OFF: 23.40 OFF: 23:40 OFF: 3840.0

ANALYSIS REQUESTED:
CONTAINER COLOR PRESERVATIVE MGP NAME
PLASTIC BAG WHITE NONE AM~~01~~ PARTICULATE ~~LEAD~~ TOTAL METALS P.R. IN AIR BY

MR 8/29/90

COMMENTS: BR-AM-03-1

On site sample, location: northeast edge of tailings pile. Approximately 50 feet northeast of Big River.

SAMPLE COLLECTED BY : Roberts / McCall / Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 404 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 23 PR TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/~~24~~/90 24:00 NORTH: ____
STORET/SAROAD NO: ______ 23 PR DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 39802.8
FLOW INDICATOR: ON: 12.00 OFF: 84.00 OFF: 24:00 OFF: 40530.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM01	TOTAL METALS PR PARTICULATE ~~LEAD~~ IN AIR BY

MR 8/24/90

COMMENTS: BR-AM-04-1

Onsite sample, location Approximately 100 feet north of land fill shed.

SAMPLE COLLECTED BY : Roberts / McCall / Silva

2 page/pages has/have been removed for confidentiality reasons.

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 408 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 23 PR TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/~~24~~/90 24:00 NORTH: ____
STORET/SAROAD NO: ______ 23 PR DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 1480.0
FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 890.03

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~ MS 5/24/90	PARTICULATE ~~LEAD~~ IN AIR BY TOTAL METALS PR

COMMENTS: BR-AM-08-1

Field Daily Blank

SAMPLE COLLECTED BY : Roberts/Silva/Roberts

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 409 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24 O.S./90 ~~11:45~~ 12:00 O.S. EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/24/90 ~~23:45~~ 24:00 O.S. NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: ~~11:45~~ 12:00 O.S. ON: ~~6312.2~~ 1388.0 O.S.
FLOW INDICATOR: ON: 12 00 OFF: 24 00 OFF: ~~23:45~~ 24:00 O.S. OFF: ~~7037.1~~ 2113.1 O.S.

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM01~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

wrs 11/29/90 O.S.

COMMENTS: BR-AM-01-2

SAME AS SAMPLE # CSXCR400

SAMPLE COLLECTED BY : ROBERTS /McColl /Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 410 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 24 /90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/24/90 23:50 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER ________ ON: 12:00 ON: 125516

FLOW INDICATOR: ON: 12:00 OFF: 23:50 OFF: 23:50 OFF: 132665

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM31~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

MS 8/29/90 O-S

COMMENTS: BR-AM-02-2

SAME AS SAMPLE # CSXCR402

SAMPLE COLLECTED BY : Roberts/McColl/Silva

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 411 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE • TIME • FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24.05 /90 12:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/24/90 23:30 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 3840.0
FLOW INDICATOR: ON: 1200 OFF: 23:30 OFF: 23:30 OFF: 4533.8

ANALYSIS REQUESTED:
CONTAINER COLOR PRESERVATIVE MGP NAME
PLASTIC BAG WHITE NONE ~~AMC1~~ PARTICULATE ~~LEAD~~ Total metals IN AIR BY
mg/kg 0.5

COMMENTS: BR-AM-03-2

0.5

SAME AS SAMPLE CSXCR ~~403~~ 403

SAMPLE COLLECTED BY : Roberts/McColl/Silva

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 412 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 24 /90 12:~~00~~ EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/25/90 00:15 NORTH: ____

STORET/SARDAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER ______ ON: 12:00 ON: 40520.8

FLOW INDICATOR: ON: 12:00 OFF: 00:15 OFF: 00:15 OFF: ~~40~~ 41263.0

O.S.

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM~~	PARTICULATE ~~LEAD~~ TOTAL METALS IN AIR BY

O.S. MG 7/29/90

COMMENTS: BR-AM-04-2

SAME AS SAMPLE CSXCR404

SAMPLE COLLECTED BY : ROBERTS/McCall/Silva

1 page/pages has/have been removed for confidentiality reasons.

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 414 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~23~~ 24/90 11:45 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/24/90 23:45 NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER ________ ON: 11:45 ON: 6312.2
FLOW INDICATOR: ON: 11:45 OFF: 23:45 OFF: 23:45 OFF: 7031.1

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM01~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

M-daly-hp

COMMENTS: BR-AM-Ø6-Z

~~SAM~~ O.S.

~~SAME AS~~ O.S. CSXCR~~X~~ 406

SAME AS SAMPLE CSXCR40

SAMPLE COLLECTED BY : ROBERTS / McColl / Silva

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 415 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24 90 12:05 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/24/__ 23:50 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:05 ON: ~~0358~~ 5134.7
FLOW INDICATOR: ON: 12:05 OFF: 23:50 OFF: 23:50 OFF: 5844.3

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM01~~ mg/ag/m	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY D.J.

COMMENTS: BR-AM-07-Z

SAME AS SAMPLE CSXCR 407

SAMPLE COLLECTED BY : ______________________

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: C3XCP SAMNO: 416 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 24.05/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/24/90 24:00 NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER ________ ON: 12:00 ON: 890.03
FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 1610.03

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~21~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

MS 10/27/92 O.S.

COMMENTS: BR-AM-08-2

Field Daily Blank

SAMPLE COLLECTED BY : ROBERTS/McColl/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 417 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 25 (PR)/90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/25/90 24:00 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF/DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: ~~7631.1~~ 2113.1 PR

FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: ~~7747.6~~ 2828.2 PR

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AMC1	PARTICULATE ~~LEAD~~ TOTAL METALS P.R IN AIR BY

mg 8/29/92

COMMENTS: BR-AM-Ø1-3

Location same as CSXCR 4ØØ

SAMPLE COLLECTED BY : Roberts/Silva/McCall

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 418 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~/90 12:00 EAST: ____

CASE/BATCH/SMC: _____/_/______ LAB: ___ END: 07/~~25~~ 23/90 24:00 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 132665

FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 139828

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~C1~~	PARTICULATE ~~LEAD~~ TOTAL METALS IN AIR BY

MS 10/29/90

COMMENTS: BR-AM-02-3

Location same as CSX CR 402

SAMPLE COLLECTED BY : Roberts/Silva/McCall

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 419 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DSC: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 25 P.R. TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/24/90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/25/90 23:30 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 4533.8

FLOW INDICATOR: ON: 12:00 OFF: 23:30 OFF: 23:30 OFF: 5233.1

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM21~~	PARTICULATE ~~LEAD~~ TOTAL METALS P.R. IN AIR BY

MS 8/27/90

COMMENTS: BR-AM-03-3

Location same as CSXCR403

SAMPLE COLLECTED BY : Roberts / McCall / Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 420 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: 133 PT: LONGITUDE:__ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 25 PR TIME FROM REF PT

LOCATION: DESLOGE MO BEG: ~~07/27/90~~ 12:00 EAST: ___

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/26/90 09:00 NORTH: ___

STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 41263.0

FLOW INDICATOR: ON: 12:00 OFF: 09:00 OFF: 09:00 OFF: 42517.3

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~	PARTICULATE ~~LEAD~~ TOTAL METALS P.R IN AIR BY

M 8/29/90

COMMENTS: BR-AM-Ø4-3

Same Location as CSXCR 4Ø4

SAMPLE COLLECTED BY : Roberts/Silva/McColl

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 421 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~/90 11:30 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/25/90 24:00 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 11:30 ON: 21269.9
FLOW INDICATOR: ON: 11:30 OFF: 24.00 OFF: 24:00 OFF: 21284.2

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM01	PARTICULATE ~~LEAD~~ TOTAL METALS IN AIR BY

COMMENTS: BR-AM-Ø5-3

Sample Location Same as CSXCR 413

SAMPLE COLLECTED BY : Roberts/McCall/Silva

DRAFT

FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 422 QCC: _ MEDIA: AIR PL: S P F O

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE • TIME • FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 25/90 12:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/25/90 24:00 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 7031.1
FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 7247.6

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AMO~~T~~	PARTICULATE ~~LEAD~~ TOTAL METALS IN AIR BY

P.2

FM 8/29/90

COMMENTS: BR-AM-06-3

Sample location same as ~~406~~ CSXCR 406

SAMPLE COLLECTED BY : Roberts/McCall/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 423 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 25 P.R. TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~/90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/26/90 00:15 NORTH: ____

STORET/SAROAD NO: _____ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 5844.3

FLOW INDICATOR: ON: 12:00 OFF: 00:15 OFF: 00:15 OFF: 6585.0

ANALYSIS REQUESTED:

CONTAINER COLOR PRESERVATIVE MGP NAME Total METALS P.R.

PLASTIC BAG WHITE NONE AMO1 PARTICULATE ~~LEAD~~ IN AIR BY

ms 3/21/91

COMMENTS: BR-AM-07-3

Sample location same as CSXCR07

SAMPLE COLLECTED BY : Barrett/Silva/McCall

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 424 QCC: F MEDIA: AIR PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

AMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
OCATION: DESLOGE MO BEG: 07/27/90 12:00 EAST: ____
ASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/25/90 24:00 NORTH: ____
TORET/SAROAD NO: ______ DOWN: ____

ONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
UMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 1610.03
FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 8330.03

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~1~~	PARTICULATE ~~LEAD~~ TOTAL METALS IN AIR BY

M 8/10 ?/90

COMMENTS: BR-AM-08-3

Field Daily Blank

SAMPLE COLLECTED BY : Roberts/McColl/Silva

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 425 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 ~~12:00~~ 11:30 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/27/90 00:50 NORTH: ____
TDRET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER ______ ON: ~~12:00~~ 11:30 ON: 28282
FLOW INDICATOR: ON: 11:30 OFF: 00:50 OFF: 00:50 OFF: 3598.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM01~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

MAS 1/29/91

COMMENTS: BR-AM-01-4

SAME AS CSXCR 400

SAMPLE COLLECTED BY : Roberts/McColl/Sivils

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 426 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26 O.S./90 ~~12:00~~ 11:30 O.S. EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/27/90 00:06 NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: ~~12:00~~ 11:30 O.S. ON: ~~28282~~ 13989.8 O.S.
FLOW INDICATOR: ON: ~~12:00~~ 11:30 O.S. OFF: 00.06 OFF: 00:06 OFF: 14715.9

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM21~~	PARTICULATE ~~LEAD~~ Total Metals O.S. IN AIR BY

MS 8/27/90

COMMENTS: BR-AM-02-4

SAME AS CSXCR 402

SAMPLE COLLECTED BY : Roberts / McCall / Silva

:AFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTID: CSXCR SAMNO: 427 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/26/90 23:21 NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER ________ ON: 12:00 ON: 5233.1
FLOW INDICATOR: ON: 12:00 OFF: 23:21 OFF: 23:21 OFF: 5914.8

12:00 O.S.

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

O.S.
8/29/90

COMMENTS: BR-AM-03-4

SAME AS CSXCR 403

SAMPLE COLLECTED BY : Roberts/McColl/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCP SAMNO: 428 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 26 C.S. /90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/26/90 24:00 NORTH: ____

STORET/SAROAD NO: _____ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 425173

FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 439686

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~21~~	PARTICULATE ~~LEAD~~ Total metals IN AIR BY C.C.

jrs 8/29/90

COMMENTS: BR AM-044

SAME AS CSXCR 404

SAMPLE COLLECTED BY : Roberts / McColl / Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 429 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 26 O.S./90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/26/90 23:15 NORTH: ____

TORET/SARCAD NO: _____ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 21984.2

FLOW INDICATOR: ON: 12:00 OFF: 23:15 OFF: 23:15 OFF: 22659.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM31~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

MG 7/24/90 O.S.

COMMENTS: BR-AM05-4

SAME AS CSXCR 413

SAMPLE COLLECTED BY : Roberts/Mc Coll/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 430 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 26 O.S. /90 12:00 EAST: ____

CASE/BATCH/SMO: ______/_/______ LAB: __ END: 07/27/90 00:26 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 7747.6

FLOW INDICATOR: ON: 12:00 OFF: 00:26 OFF: 00:26 OFF: 8493.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY O.S.

MS 1/24/90

COMMENTS: B2-AM-06-4

SAME AS CSXCR 406

SAMPLE COLLECTED BY : Roberts/McColl/Lilus

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 431 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE, TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 12:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/26/90 23:55 NORTH: ___
STORET/SARGAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 6585.0
FLOW INDICATOR: ON: 12:00 OFF: 23:55 OFF: 23:55 OFF: 7300.1

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM01~~	PARTICULATE ~~LEAD~~ Total Metals IN AIR BY

8/2/90

COMMENTS: BR-AM-07-4

SAMC CSXCR 407

SAMPLE COLLECTED BY : Roberts/McCall/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSKC? SAMNO: 432 QCC: F ~~FB~~ Fdo MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 12:00 EAST: ___

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/26/90 24:00 NORTH: ___

STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 2330.03

FLOW INDICATOR: ON: 12:00 OFF: 24:00 OFF: 24:00 OFF: 3050.03

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM01	PARTICULATE ~~LEAD~~ Total metals IN AIR BY

COMMENTS: BR-AM-08-4

DAILY FIELD BLANK

SAMPLE COLLECTED BY : Roberts/McColl/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 433 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS ' DATE 'TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 ~~11:30~~ 12:00 PR EAST: ____

CASE/BATCH/SMO: ______/_/______ LAB: ___ END: 07/27/90 23:59 NORTH: ____

STORET/SARDAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 3598.8

FLOW INDICATOR: ON: 12:00 OFF: 23:59 OFF: 23:59 OFF: 4312.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~1~~	PARTICULATE ~~LEAD~~ Total METALS (P.R) IN AIR BY

YM 5/29/90

COMMENTS: BR-AM-01-S

Same as CSXCR 400

SAMPLE COLLECTED BY : Roberts / McCall / Silva

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 434 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE, TIME, FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 12:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: __ END: 07/27/90 23:41 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 14715.9
FLOW INDICATOR: ON: 12.00 OFF: 23.41 OFF: 23:41 OFF: 15417.7

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM21~~	Total METALS P.R. PARTICULATE ~~LEAD IN~~ AIR BY

MG 7/27/90

COMMENTS: BR-AM-02-5

Same as CSXCR 403

SAMPLE COLLECTED BY : Roberts/McCall/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 435 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 12:00 EAST: ___

CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/27/90 23:42 NORTH: ___

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 5914.8

FLOW INDICATOR: ON: ___12.00 OFF: _23.42 OFF: 23:42 OFF: 6617.0

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AMOT	Total Metals P.R. PARTICULATE ~~LEAD~~ IN AIR BY

MZ 6/29/91

COMMENTS: B2-DM-Ø3-S

Same as CSXCR 403

SAMPLE COLLECTED BY : Roberts / McCall / Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 436 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 13:00 EAST: ___

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/28/90 06:11 NORTH: ___

STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 13:00 ON: 43236.9

FLOW INDICATOR: ON: 13:00 OFF: 06:11 OFF: 06:11 OFF: 43968.6

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM ~~1~~	PARTICULATE ~~LEAD IN~~ Total Metals IN AIR BY

P.R

MZ 3/21/90

COMMENTS: BR-DM-04-S

Same as CSXCR 404

SAMPLE COLLECTED BY : Roberts / McCall / Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

TY: PC ACTNO: CSXCR SAMNO: 437 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 11:45 EAST: ___
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/28/90 1:00 NORTH: ___
STORET/SAROAD NO: _____ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 11:45 ON: 22659.8
FLOW INDICATOR: ON: 11.45 OFF: 1.00 OFF: 1:00 OFF: 23442.2

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM01	PARTICULATE ~~LEAD~~ Total Metals (PR) IN AIR BY

MJ 8/29/90

COMMENTS: BR-AM-05-5

Same as CSXCR 413

SAMPLE COLLECTED BY : Roberts/McCall/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 438 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: ___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/27/90 12:00 EAST: ___

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 07/28/90 00:24 NORTH: ___

STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: ________

FLOW INDICATOR: ON: 12:00 OFF: 00:24 OFF: 00:24 OFF: ________

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~	PARTICULATE ~~LEAD~~ Total Metals P.R IN AIR BY

MC 8/29/90

COMMENTS: BR-AM-06-5

Same as CSXCR 406

SAMPLE COLLECTED BY : Roberts/McCall/Silva

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 439 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 07/28/90 00:27 NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR P.R
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: ~~730.01~~ 7300.1
FLOW INDICATOR: ON: 12.00 OFF: 00:27 OFF: 00:27 OFF: 8047.1

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	~~AM01~~ 2m 8/27/90	PARTICULATE ~~LEAD IN~~ Total Metals P.R IN AIR BY

COMMENTS: BGAM-07-5

Same as CSXCR 407

SAMPLE COLLECTED BY: Roberts / McCall / Silva

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 440 QCC: FB MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS
LOCATION: DESLOGE MO
CASE/BATCH/SMO: _____/_/______ LAB: __
STORET/SAROAD NO: ______

	DATE	TIME	FROM REF PT	
BEG:	07/27/90	12:00	EAST:	___
END:	07/27/90	24:00	NORTH:	___
			DOWN:	___

CONTAINER/FILTER TYPE: _ NUMBER ________
PUMP/MOTOR TYPE: _ NUMBER _____
FLOW INDICATOR: ON: 12:00 OFF: 24:00

TIME OF DAY: ON: 12:00 OFF: 24:00
TIME INDICATOR: ON: 3050.03 OFF: 3771.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM01	PARTICULATE ~~LEAD~~ Total METALS IN AIR BY

P.R.

COMMENTS: BR-AM-08-5

Daily Field Blank

SAMPLE COLLECTED BY : Roberts/McCall/Silva

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 441 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 12:00 EAST: ___
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 7/28/90 23:56 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 4317.8
FLOW INDICATOR: ON: 12:00 OFF: 23:56 OFF: 23:56 OFF: 5034.7

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM01	PARTICULATE ~~LEAD IN~~ total metals AIR BY

MB 8/24/90

COMMENTS: BR-AM-01-6

Sample location same as CSXCR 400

SAMPLE COLLECTED BY : Roberts / McCall / Silva

DRAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 442 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 26/90 12:00 EAST: ____
CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 7/26/90 23:39 NORTH: ____
STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 15417.7
FLOW INDICATOR: ON: 12:00 OFF: 23:39 OFF: 23:39 OFF: 16116.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~21~~	PARTICULATE ~~LEAD IN~~ total Metals AIR BY

Mc 8/29/90

COMMENTS: BR-AM-Ø2-6

Sample location same as CSXCR 4Ø2

SAMPLE COLLECTED BY : Roberts/McCall/Silva

RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 443 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: 433 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/27/90 13:55 EAST: ___
CASE/BATCH/SMC: _____/_/______ LAB: ___ END: 7/29/90 03:00 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 13:55 ON: 6617.0
FLOW INDICATOR: ON: 13:55 OFF: 03:00 OFF: 03:00 OFF: 7397.8

ANALYSIS REQUESTED:
CONTAINER COLOR PRESERVATIVE MGP NAME total metals
PLASTIC BAG WHITE NONE ~~AM01~~ PARTICULATE ~~LEAD~~ IN AIR BY ICP
RR 5/29/90

COMMENTS: BRAM-03-6

Sample location same as CSXCR 403

SAMPLE COLLECTED BY : Roberts / Silva / McCall

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 444 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 24/M TIME FROM REF PT

LOCATION: DESLOGE MO BEG: 07/~~27~~/90 12:00 EAST: ____

CASE/BATCH/SMO: _____/_/______ LAB: ___ END: 7/24/90 23:42 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 43964.6

FLOW INDICATOR: ON: 12:00 OFF: 23:42 OFF: 23:47 OFF: 44675.8

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~ M	PARTICULATE ~~LEAD~~ total metals IN AIR BY

8/21/90

COMMENTS: BRAM-Ø46

Sample location same as CSXCR Ø4

SAMPLE COLLECTED BY : Roberts / Silva / McFall

.RAFT FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 445 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE:___ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
LOCATION: DESLOGE MO BEG: 07/~~27~~ 28/90 11:39 EAST: ___
CASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 7/29/90 00:30 NORTH: ___
STORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 11:39 ON: 23442.2
FLOW INDICATOR: ON: 11:39 OFF: 00:30 OFF: 00:30 OFF: 24215.6

ANALYSIS REQUESTED:
CONTAINER COLOR PRESERVATIVE MGP NAME
PLASTIC BAG WHITE NONE AM01 PARTICULATE ~~LEAD~~ total metals ICP IN AIR BY

MB 8/29/90

COMMENTS: BR-AM-05-6

Sample location same as CSXCR413

SAMPLE COLLECTED BY : Roberts / Silva / McGill

DRAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

FY: 90 ACTNO: CSXCR SAMNO: 446 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

SAMPLE DES: BIG RIVER MINE TAILINGS DATE 24th TIME FROM REF PT

LOCATION: DESLOGE MO BEG: C7/~~27~~/90 11:45 EAST: ____

CASE/BATCH/SMC: _____/_/______ LAB: ___ END: 7/24/90 21:15 NORTH: ____

STORET/SAROAD NO: ______ DOWN: ____

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

PUMP/MOTOR TYPE: _ NUMBER _____ ON: 11:45 ON: 4237.8

FLOW INDICATOR: ON: 11:45 OFF: 21:15 OFF: 21:15 * OFF: 4471.0 *

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~ 2	PARTICULATE ~~LEAD~~ total metals IN AIR BY

MA 8/27/90

COMMENTS: BR-AM-Φ6-6

Sample Location same as CSXCR 4Φ6

* Fuse blew in flow controler
∴ Short sample time

SAMPLE COLLECTED BY : Roberts / Silva / McFall

RAFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCR SAMNO: 448 QCC: _ MEDIA: AIR PL: S P F D

ACTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __
LOCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

AMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT
OCATION: DESLOGE MO BEG: 07/~~27~~ 90 12:00 EAST: ___
ASE/BATCH/SMC: _____/_/______ LAB: ___ END: 7/24/90 23:30 NORTH: ___
TORET/SAROAD NO: ______ DOWN: ___

CONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR
PUMP/MOTOR TYPE: _ NUMBER _____ ON: 12:00 ON: 8047.1
FLOW INDICATOR: ON: 12:00 OFF: 23:30 OFF: 23:30 OFF: 8237.9

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM~~01~~	PARTICULATE ~~LEAD~~ total metals IN AIR BY

MS 8/27/90

COMMENTS: BR-AM-076

Sample location same as CSXCR 407

SAMPLE COLLECTED BY : Roberts / Silva / McCall

AFT FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII

ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Y: 90 ACTNO: CSXCP SAMNO: 0449 QCC: _ MEDIA: AIR PL: S P F D

CTIVITY DES: BIG RIVER MINE TAILINGS REF LATITUDE: __ __ __

OCATION: DESLOGE MO PROJECT NUM: A33 PT: LONGITUDE: __ __ __

AMPLE DES: BIG RIVER MINE TAILINGS DATE TIME FROM REF PT

OCATION: DESLOGE MO BEG: 07/~~27~~ 24/90 12:00 EAST: ____

ASE/BATCH/SMO: _____/_/_____ LAB: ___ END: 7/28/90 24:00 NORTH: ____

TORET/SAROAD NO: ______ DOWN: ____

ONTAINER/FILTER TYPE: _ NUMBER ________ TIME OF DAY TIME INDICATOR

UMP/MOTOR TYPE: _ NUMBER ____ ON: 12:00 ON: 3726.8

LOW INDICATOR: ON: 12:00 OFF: 22:00 OFF: 24:00 OFF: 4492.4

ANALYSIS REQUESTED:

CONTAINER	COLOR	PRESERVATIVE	MGP	NAME
PLASTIC BAG	WHITE	NONE	AM0~~1~~	PARTICULATE ~~LEAD~~ total metals IN AIR BY

OMMENTS: BR-AM-086

Daily field blank

AMPLE COLLECTED BY : Roberts/Silva/McFall

APPENDIX F

PHOTOGRAPHIC RECORD

APPENDIX E

FIELD SHEETS AND CHAIN-OF-CUSTODY RECORDS

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Overfelt, Bob	Big River Mine Tailings	23-27 / 7 / 90	1 of 5

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	8 oz BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
CSXGR 001		1					X				
002		1					X				
003		1					X				
004		1					X				FM00616XA, 24
005		1					X				
006		1					X				
007		1					X				
008		1					X				
009		1					X				
010		1					X				
011		1					X				
012		1					X				
013		1					X				
014		1					X				
015		1					X				
016		1					X				
017		1					X				
018		1					X				
019		1					X				
020		1					X				
021		1					X				
022		1					X				
023		1					X				
024		1					X				

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
____ PIECE(S) CONSISTING OF ____ BOX(ES)	____ COMMERCIAL CARRIER: ____
____ ICE CHEST(S); OTHER ____	____ COURIER
	____ SAMPLER CONVEYED ____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY (SAMPLER): Robert C. Overfelt — SEALED ☐ UNSEALED ☒	7/28/90	8:30	Sharon P. Martin — SEALED ☐ UNSEALED ☒	Transport to KC
Sharon P. Martin — SEALED ☐ UNSEALED ☒	7/30/90	1000	Robert C. Overfelt — SEALED ☐ UNSEALED ☒	Transport to EPA Lab
Robert C. Overfelt — SEALED ☐ UNSEALED ☒	7/30/90	1200	[illegible] 7/30/90 11:55 — SEALED ☐ UNSEALED ☒	Analysis

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Overfelt, Bob	Big River Mine Tailings	23-27 / 7 / 90	2 of 5

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	8 oz BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
CSXCR 026		1					X				
027		1					X				
028		1					X				
029		1					X				FM00616XA, 24
030		1					X				
CSXCR 100		1						X			
101		1						X			
102		1						X			
103		1						X			
104		1						X			
105		1						X			
106		1						X			
107		1						X			
108		1						X			
109		1						X			
110		1						X			
111		1						X			
112		1						X			
112D		1						X			
113		1						X			
114		1						X			
115		1						X			
116		1						X			
117		1						X			

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
____ PIECE(S) CONSISTING OF ____ BOX(ES)	____ COMMERCIAL CARRIER ____
____ ICE CHEST(S); OTHER ____	____ COURIER
	____ SAMPLER CONVEYED ____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
(SAMPLER) Robert C Overfelt; ☐ SEALED ☒ UNSEALED	7/28/90	830	Shaun P Martin; ☐ SEALED ☒ UNSEALED	Transport to ~~[illegible]~~ KC
Shaun P Martin; ☐ SEALED ☒ UNSEALED	7/30/90	1000	Robert C Overfelt; ☐ SEALED ☒ UNSEALED	Transport to EPA Lab
Robert C Overfelt; ☐ SEALED ☒ UNSEALED	7/30/90	1000	[illegible]; ☐ SEALED ☒ UNSEALED	[illegible]

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Overfelt, Bob	Big River Mine Tailings	23-27 / 7 / 90	3 of 5

CONTENTS OF SHIPMENT

SAMPLE NUMBER	1-Liter CUBITAINER	8oz BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers etc.)
CSXCR 118		1						X			
119		1						X			
120		1						X			
CSXCR 200	2					X					FMC0616XA,
201	2					X					
202	2					X					
203	2					X					
204	2					X					
205	2					X					
206	2					X					
207	2					X					
208	2					X					
209	2					X					
210	2					X					
211	2					X					
212	2					X					
212D	2					X					
213	2					X					
214	2					X					
215	2					X					
216	2					X					
217	2					X					
218	2					X					
219	2					X					

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
____ PIECE(S) CONSISTING OF ____ BOX(ES)	____ COMMERCIAL CARRIER ____
____ ICE CHEST(S); OTHER ____	____ COURIER
	____ SAMPLER CONVEYED ____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Robert C Overfelt; SEALED ☐ UNSEALED ☒	7/28/90	830	Shawn P. Mather; SEALED ☐ UNSEALED ☒	Transport to KC
RELINQUISHED BY	**DATE**	**TIME**	**RECEIVED BY**	**REASON FOR CHANGE OF CUSTODY**
[illegible] P. Mather; SEALED ☐ UNSEALED ☒	7/30/90	1000	Robert C Overfelt; SEALED ☐ UNSEALED ☐	Transport to EPA Lab
RELINQUISHED BY	**DATE**	**TIME**	**RECEIVED BY**	**REASON FOR CHANGE OF CUSTODY**
Robert C Overfelt; SEALED ☐ UNSEALED ☒	[illegible]	1000	[illegible]; SEALED ☐ UNSEALED ☐	[illegible]

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Overfelt Bob	Big River Mine Tailings	23-27 / 7 / 90	4 of 5

CONTENTS OF SHIPMENT

SAMPLE NUMBER	1-Liter CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers, etc.)
CSXCR 220	2					X					
CSXCR 300	2					X					
301	2					X					EMO0W6X4,
302	2					X					
303	2					X					
304	2					X					
305	2					X					
306	2					X					
307	2					X					
308	2					X					
309	2					X					
309D	2					X					
310	2					X					
311	2					X					
312	2					X					
314	2					X					
315	2					X					
316	2					X					
317	2					X					
318	2					X					
319	2					X					
320F	1					X					
321F	2					X					
322F	2					X					

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

DESCRIPTION OF SHIPMENT

_____ PIECE(S) CONSISTING OF _____ BOX(ES)

_____ ICE CHEST(S), OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER _____

_____ COURIER

_____ SAMPLER CONVEYED _____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
(SAMPLER) Robert Overfelt — SEALED / UNSEALED [X]	7/28/90	830	[illegible] — SEALED / UNSEALED [X]	Transport to KC
[illegible] Martin — SEALED / UNSEALED [X]	7/30/90	1000	Robert Overfelt — SEALED / UNSEALED [X]	Transport to EPA Lab
Robert Overfelt — SEALED / UNSEALED [X]	7/30/90	1200	[illegible] — SEALED / UNSEALED	[illegible]

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY MONTH YEAR)	SHEET
Overfelt Bob	Big River Mine Tailings	23-27 7 90	5 of 5

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers etc.)
CSXCR323F	2					X					
324	2					X					
324F	2										FM0Ø616XA
325F	1					X					
325		1					X				

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

DESCRIPTION OF SHIPMENT

_____ PIECE(S) CONSISTING OF _____ BOX(ES)

_____ ICE CHEST(S), OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER _____

_____ COURIER

_____ SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
(SAMPLER) Robert C. Overfelt — SEALED ☐ UNSEALED ☒	7/28/90	830	[illegible] — SEALED ☐ UNSEALED ☐	[illegible] KC
[illegible] Martin — SEALED ☐ UNSEALED ☐	7/30/90	1000	Robert C. Overfelt — SEALED ☐ UNSEALED ☒	Transport to EPA Lab
Robert Overfelt — SEALED ☐ UNSEALED ☒	7/30/90	1000	[illegible] — SEALED ☐ UNSEALED ☐	[illegible]

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
ROBERT OVERFELT	Big River Mine Tailings	28 / [illegible] / 1990	1 of 3

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers etc.)
CSXCR-400	1									✓	CMOD616XAA,74
CSXCR 402	1									✓	
CSXCR 403	1									✓	
CSXCR 404	1									✓	
CSXCR 406	1									✓	
CSXCR 407	1									✓	
CSXCR 408	1									✓	
CSXCR 409	1									✓	
CSXCR 410	1									✓	
CSXCR 411	1									✓	
CSXCR 412	1									✓	
CSXCR 413	1									✓	
CSXCR 414	1									✓	
CSXCR 415	1									✓	
CSXCR 416	1									✓	
CSXCR 417	1									✓	
CSXCR 418	1									✓	
CSXCR 419	1									✓	
CSXCR 420	1									✓	
CSXCR 421	1									✓	
CSXCR 422	1									✓	
CSXCR 423	1									✓	
CSXCR 424	1									✓	

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

DESCRIPTION OF SHIPMENT

51 PIECE(S) CONSISTING OF 51 BOX(ES)

______ ICE CHEST(S), OTHER 1 BOX

MODE OF SHIPMENT

______ COMMERCIAL CARRIER ______

______ COURIER

✓ SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Robert Overfelt ☐ SEALED UNSEALED ☐	7/30/90	1200	[illegible] ☐ SEALED UNSEALED ☐	[illegible]
RELINQUISHED BY ☐ SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY ☐ SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY ☐ SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
ROBERT OVERFELT	Big River Monitoring	23-28 July 1990	2 of 3

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt, other sample numbers etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER					SAMPLED MEDIA					
CSYCR 425	1									✓	TMO 0616 VAA, 74
CSYCR 426	1									✓	
CSYCR 427	1									✓	
CSYCR 428	1									✓	
CSYCR 429	1									✓	
CSYCR 430	1									✓	
CSYCR 431	1									✓	
CSYCR 432	1									✓	
CSYCR 433	1									✓	
CSYCR 434	1									✓	
CSYCR 435	1									✓	
CSYCR 436	1									✓	
CSYCR 437	1									✓	
CSYCR 438	1									✓	
CSYCR 439	1									✓	
CSYCR 440	1									✓	
CSYCR 441	1									✓	
CSYCR 442	1									✓	
CSYCR 443	1									✓	
CSYCR 444	1									✓	
CSYCR 445	1									✓	
CSYCR 446	1									✓	
CSYCR 448	1									✓	
CSYCR 449	1									✓	

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
51 PIECE(S) CONSISTING OF 51 BOX(ES) Baggies	___ COMMERCIAL CARRIER ___
___ ICE CHEST(S), OTHER 13 OX	___ COURIER
	✓ SAMPLER CONVEYED ___ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Robert C. Overfelt ☐ SEALED UNSEALED ☐	7/3/90	1200	7/3/?7 [signature] ☐ SEALED UNSEALED ☑	Analysis
RELINQUISHED BY ☐ SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY ☐ SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY ☐ SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
[illegible]	[illegible]	28 / JULY / 1990	3 of 3

CONTENTS OF SHIPMENT

SAMPLE NUMBER	~~CUBITAINER~~ [illegible]	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers etc)
CSXCR450	1									✓	FM0616XAA,24
CSXCR451	1									✓	
CSXCR452	1									✓	
CSXCR453	1									✓	

TYPE OF CONTAINERS — NUMBERS OF CONTAINERS PER SAMPLE NUMBER; SAMPLED MEDIA

DESCRIPTION OF SHIPMENT

51 PIECE(S) CONSISTING OF 51 ~~BOX(ES)~~ [illegible]

____ ICE CHEST(S); OTHER 1 BOX

MODE OF SHIPMENT

____ COMMERCIAL CARRIER ____

____ COURIER

✓ SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] ☐ SEALED UNSEALED ☐	7/29/90	1200	[illegible] 7/30/90 ☐ SEALED UNSEALED ☒	[illegible]
RELINQUISHED BY ☐ SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY ☐ SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY ☐ SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY

1 page/pages has/have been removed for confidentiality reasons.

16

Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD

SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 1

Subject

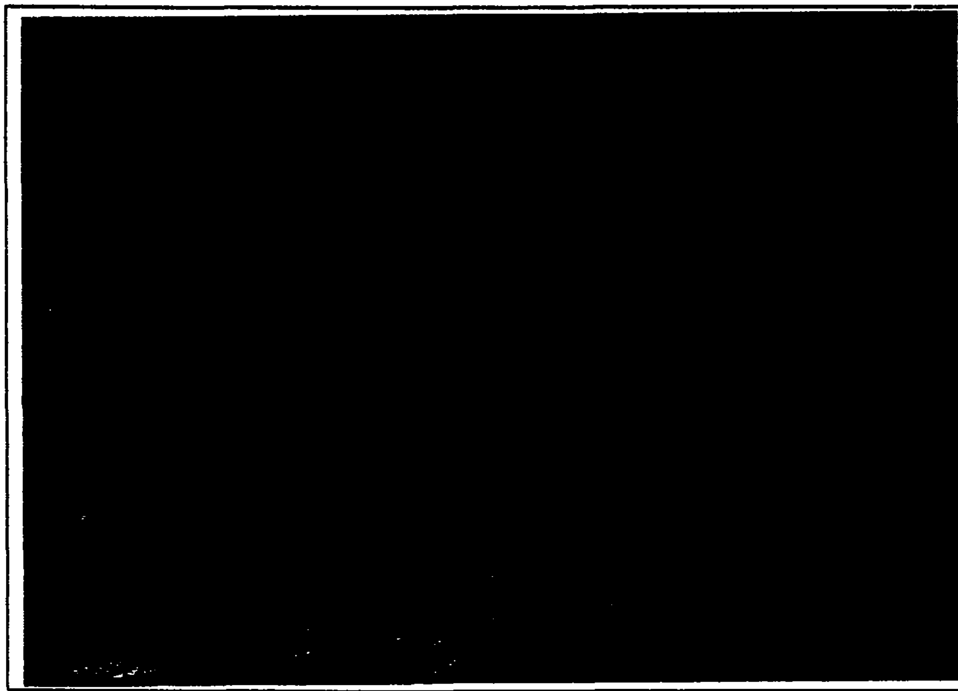
Area of 1977 major collapse. Taken from location adjacent to west bank of Big River.

Photographer
Overfelt

Witness
Gene Gunn

Date/Time
January 1988

Direction
West



No: 2

Subject

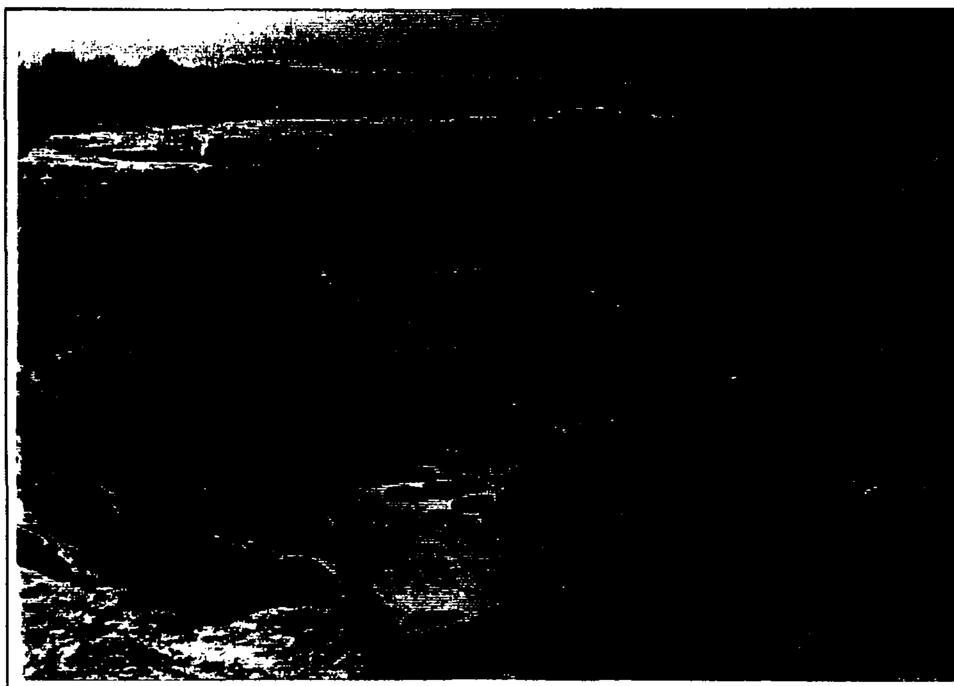
Erosion of tailings on top of pile at major collapse area.

Photographer
Overfelt

Witness
Williams

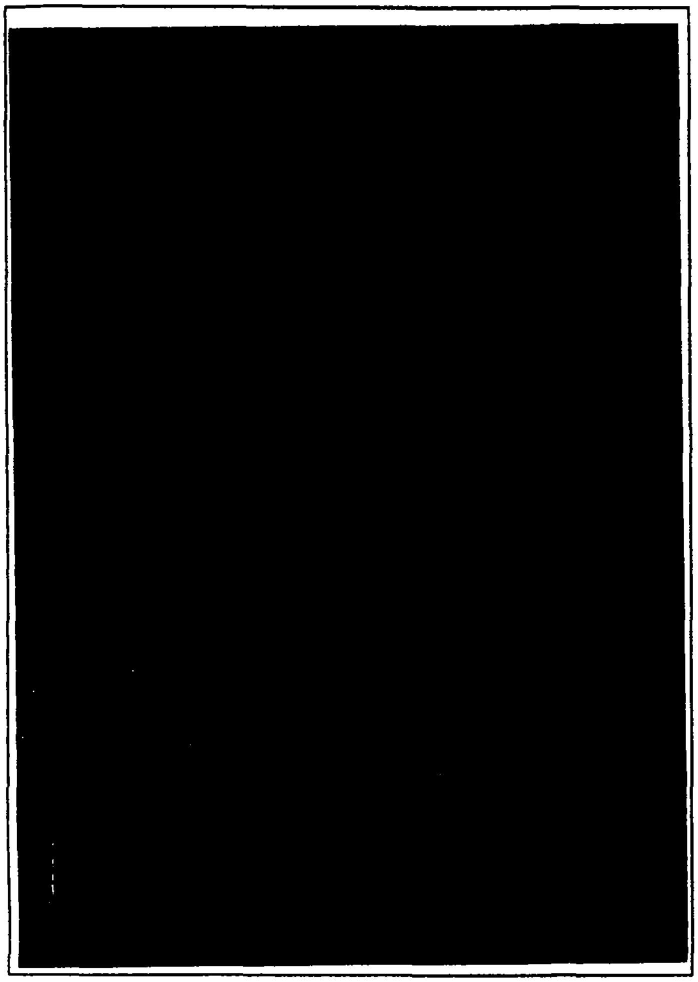
Date/Time
7/26/90
1530 hours

Direction
North



Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD



SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 3

Subject

Tailings migrating via wind erosion. Proximity of site to Big River on east side of site.

Photographer

Overfelt

Witness

Gene Gunn

Date/Time

January 1988

Direction

Northwest

No: 4

Subject

Dune features migrating west to east in east central meander area.

Photographer

Overfelt

Witness

Williams

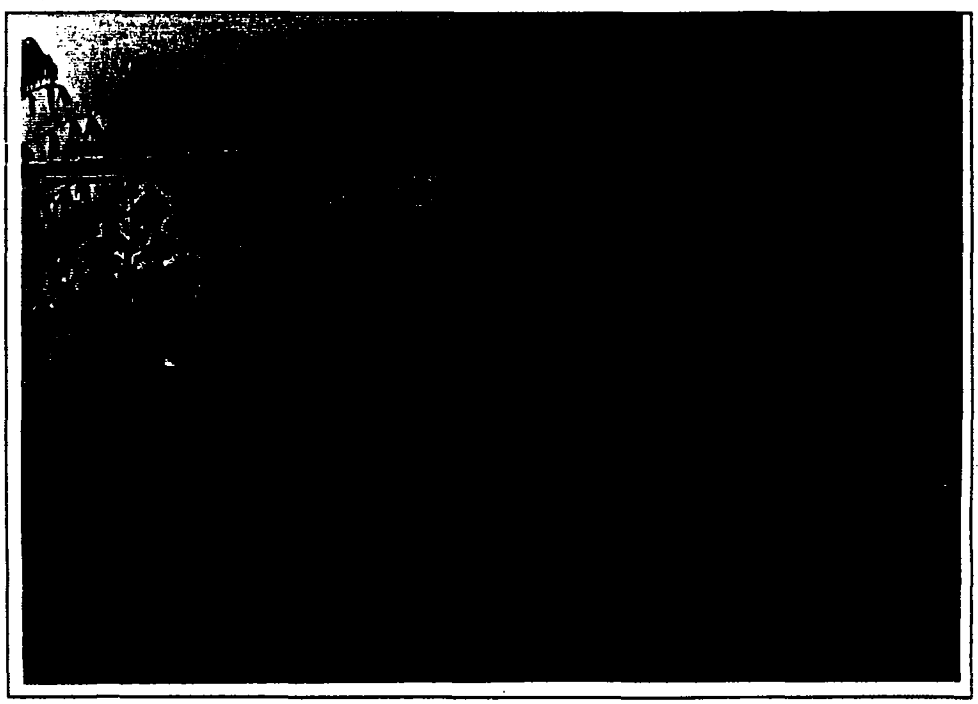
Date/Time

7/26/90

1540 hours

Direction

North



Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD

SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 5

Subject

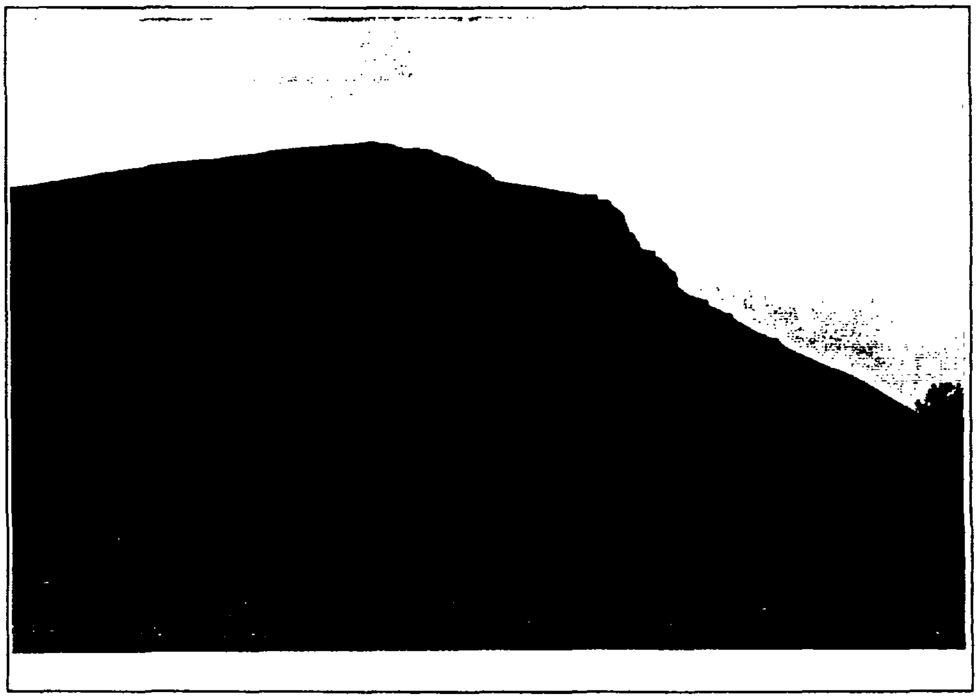
Large elevated tailings pile on St. Joe Minerals property.

Photographer
Enos

Witness
Martin

Date/Time
7/27/91
0900 hours

Direction
East



No: 6

Subject

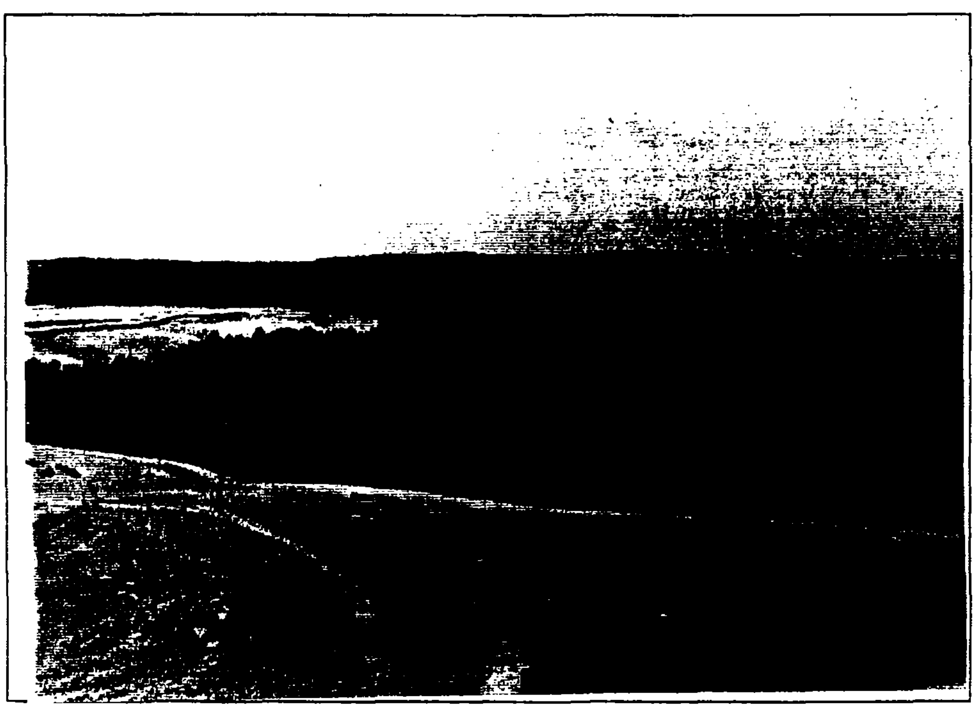
Illustrates east side of meander area and farm property east of site. Taken from on top of St. Joe Minerals property pile.

Photographer
Overfelt

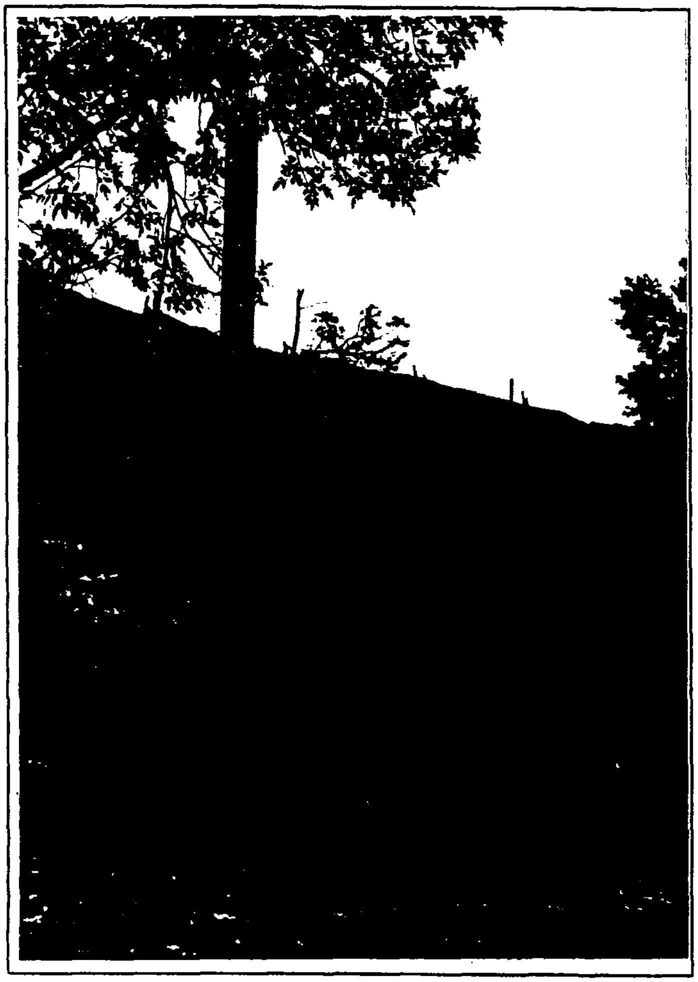
Witness
Williams

Date/Time
7/26/90
1755 hours

Direction
North/Northwest



PHOTOGRAPHIC RECORD



SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 7
Subject

Tailings entering Big River on west side of site at sample location 105, 205. Note: drainage structure on the site.

Photographer
Williams

Witness
Enos

Date/Time
7/24/90
1000 hours

Direction
East/Southeast

No: 8
Subject

Area where tailings are entering Big River on west side of site at area north of sample location 105, 205.

Photographer
Williams

Witness
Enos

Date/Time
7/24/90
1000 hours

Direction
East/Northeast

Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD

SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

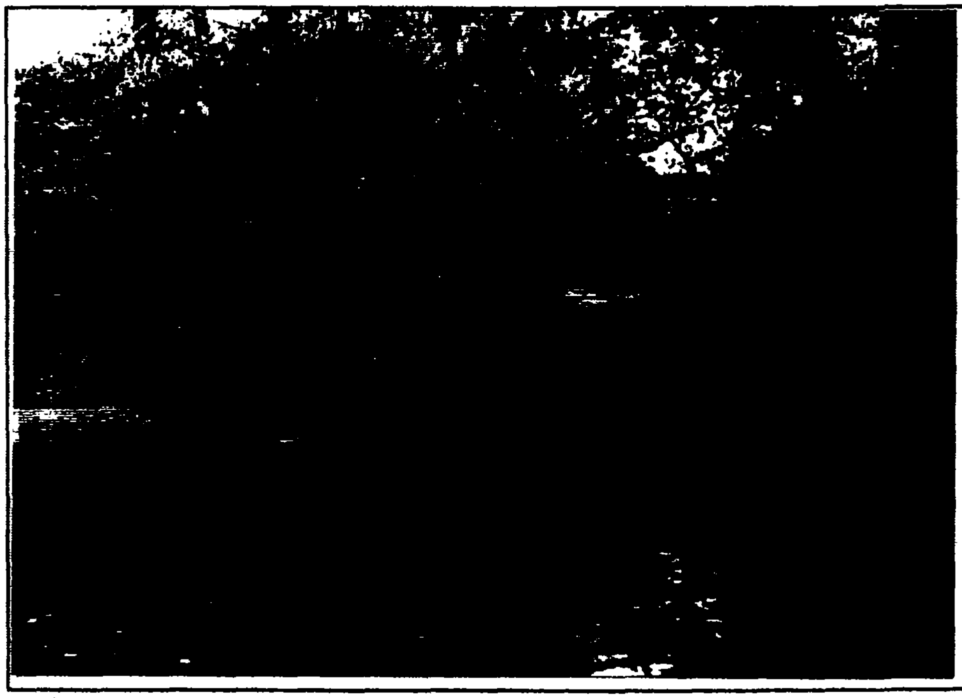
No: 9
Subject
Tailings entering Big River on north side of site.

Photographer
Overfelt

Witness
Williams

Date/Time
7/24/90
1345 hours

Direction
South



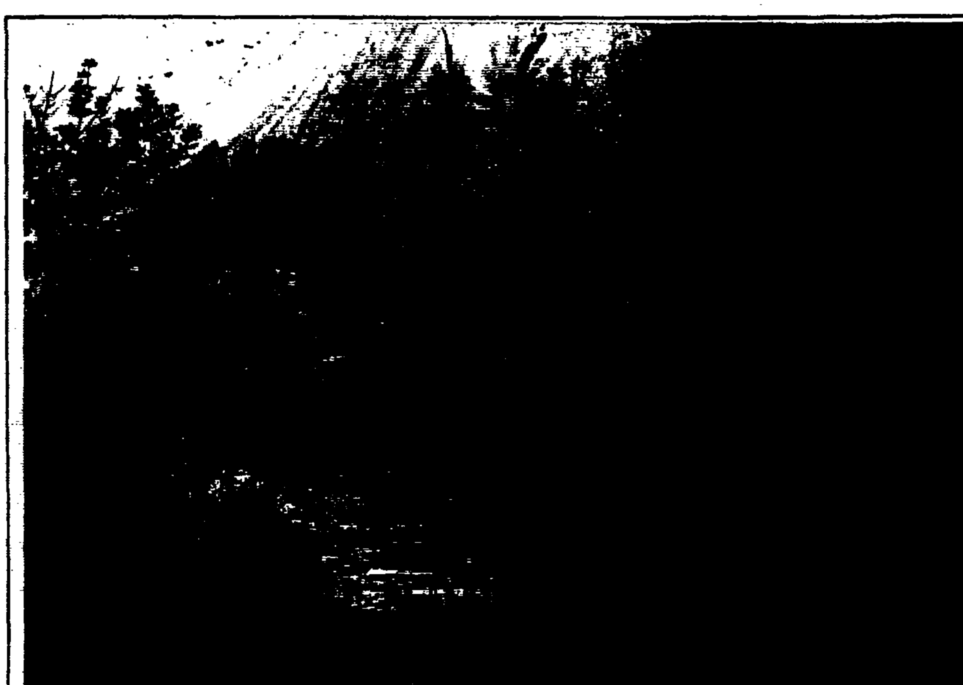
No: 10
Subject
Tailings entering Big River on east side of site at east bend in river.

Photographer
Williams

Witness
Overfelt

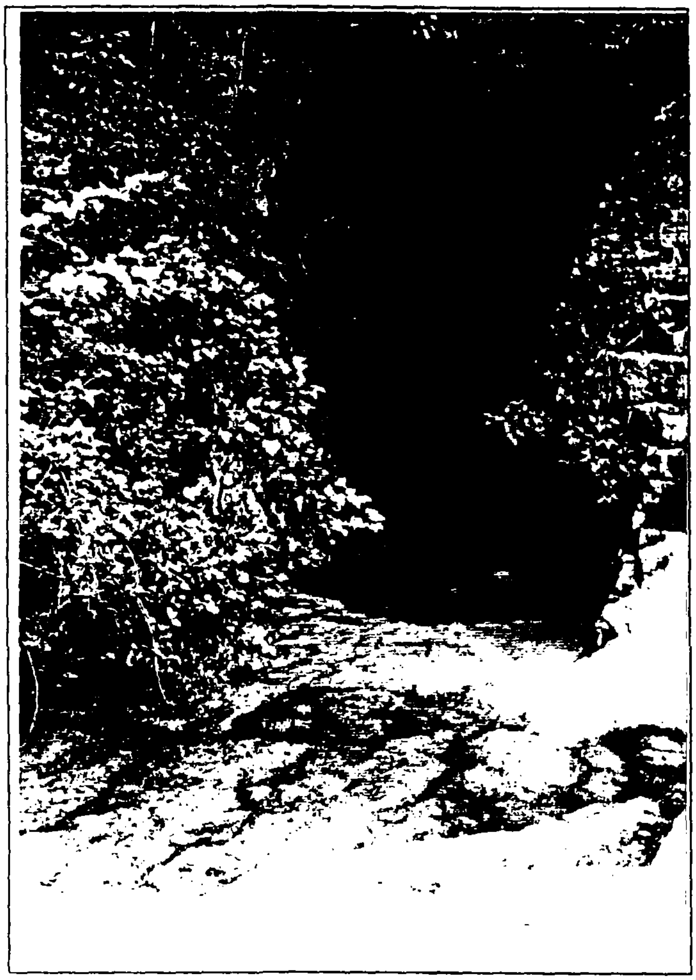
Date/Time
7/24/90
1520 hours

Direction
West



Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD



SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 11

Subject

Entrance to drainage tunnel Note: tailings on bottom of tunnel and reddish leachate seep entering tunnel.

Photographer

Overfelt

Witness

Martin

Date/Time

7/26/90
1000 hours

Direction

Northwest

No: 12

Subject

Downgradient end of drainage tunnel.

Photographer

Enos

Witness

Martin

Date/Time

7/27/90
1600 hours

Direction

Southeast

Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD

SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO616XA

No: 13

Subject

Culvert exit from landfill ponded area near drainage tunnel entrance. Note: Thickness of tailings above culvert.

Photographer
Overfelt

Witness
Martin

Date/Time
7/26/90
1005 hours

Direction
Northeast

No: 14

Subject

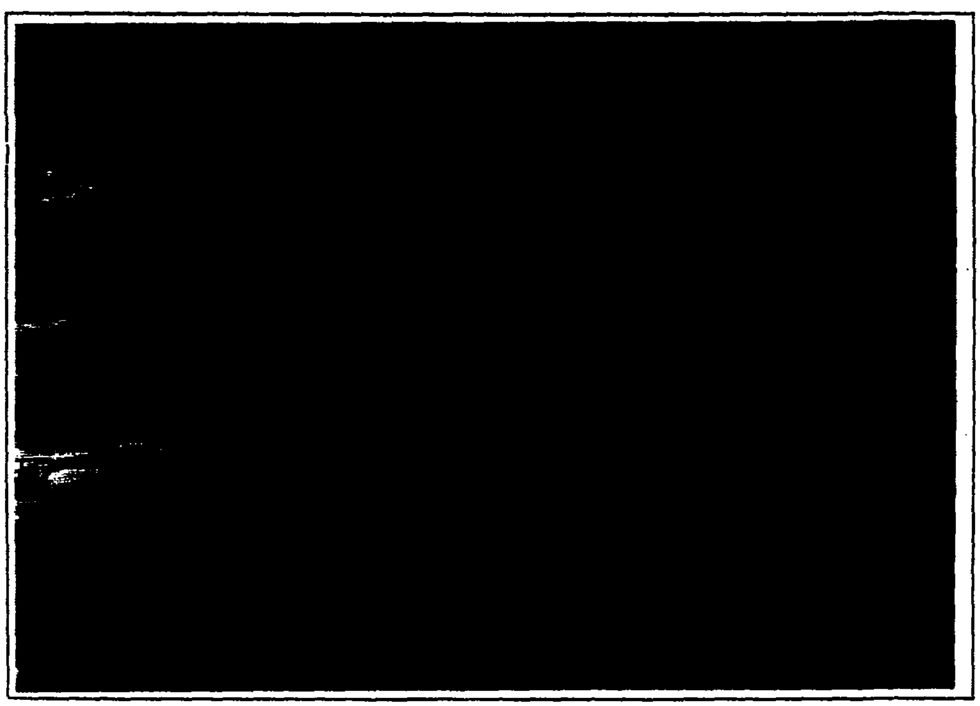
Ponded area of landfill.

Photographer
Overfelt

Witness
Martin

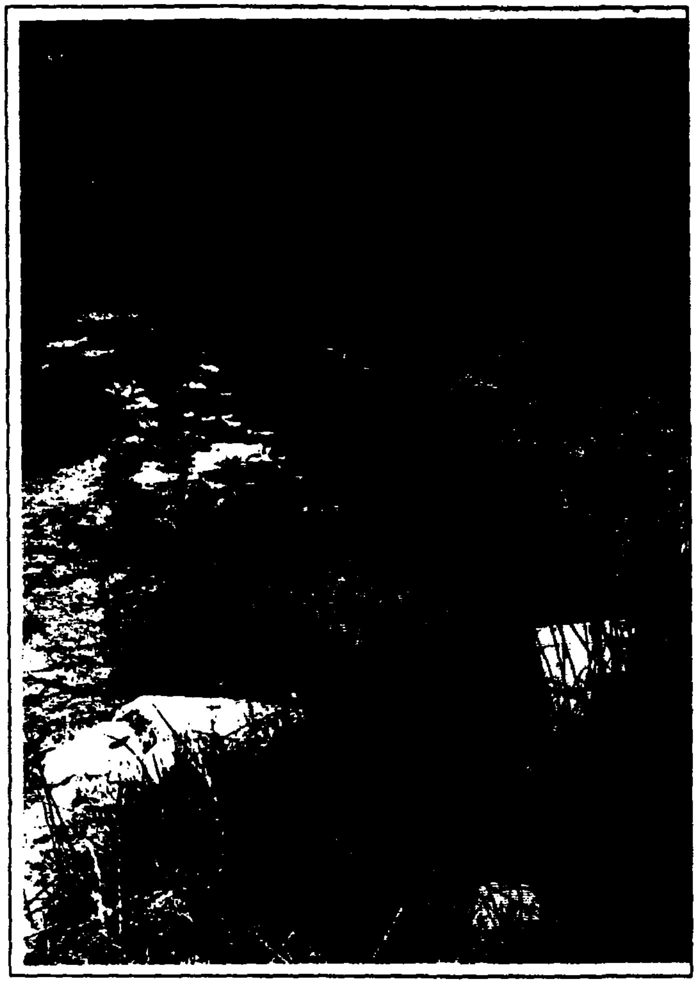
Date/Time
7/26/90
1010 hours

Direction
North



Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD



SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 15
Subject

Apparent reddish landfill leachate.

Photographer
Overfelt

Witness
Martin

Date/Time
7/26/90
1005 hours

Direction
West

No: 16
Subject

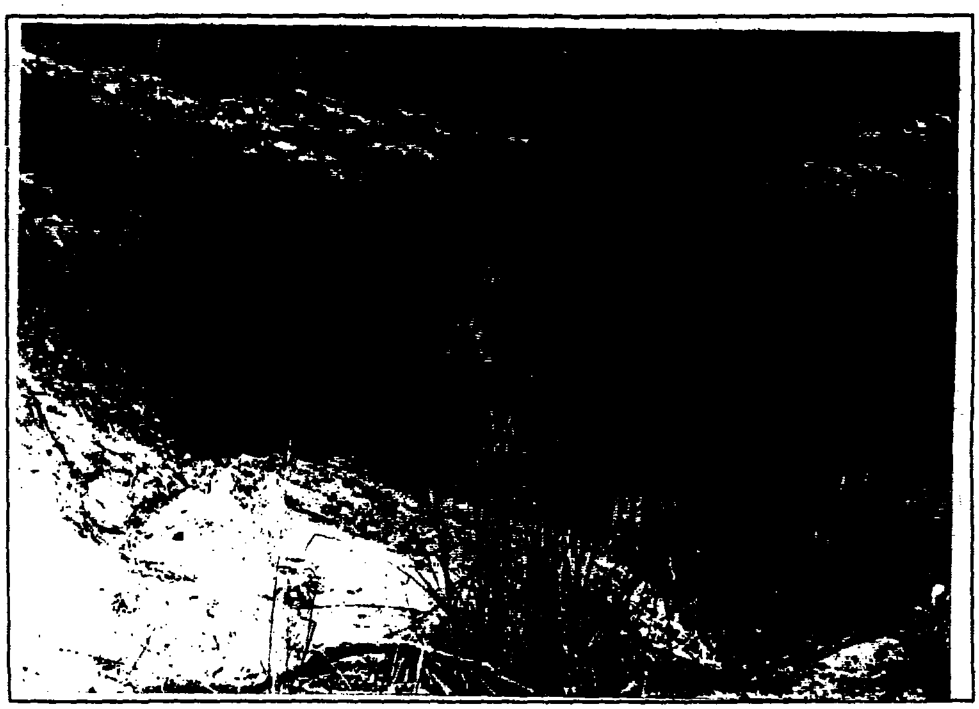
Opening to tower drainage tunnel.

Photographer
Overfelt

Witness
Martin

Date/Time
7/26/90
1005 hours

Direction
North



Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD

SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 13
Subject

Culvert exit from landfill ponded area near drainage tunnel entrance. Note: Thickness of tailings above culvert.

Photographer
Overfelt

Witness
Martin

Date/Time
7/26/90
1005 hours

Direction
Northeast

No: 14
Subject

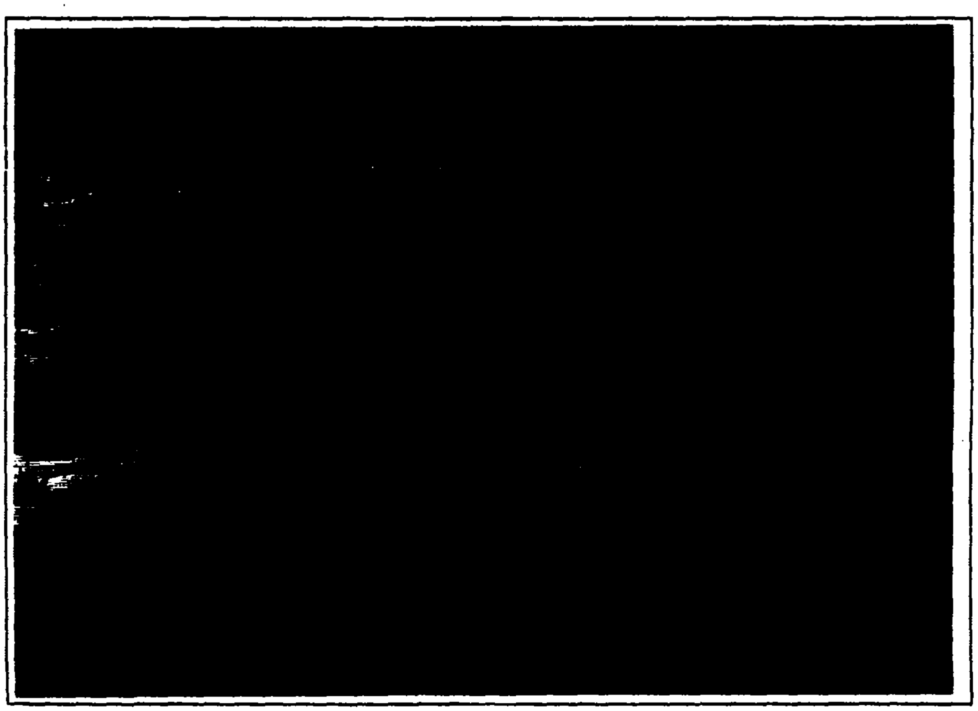
Ponded area of landfill.

Photographer
Overfelt

Witness
Martin

Date/Time
7/26/90
1010 hours

Direction
North



Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD

SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FMO0616XA

No: 17
Subject

Artesian well (exploratory boring in steel casing).

Photographer
Overfelt

Witness
Enos

Date/Time
7/26/90
1105 hours

Direction

No: 18
Subject

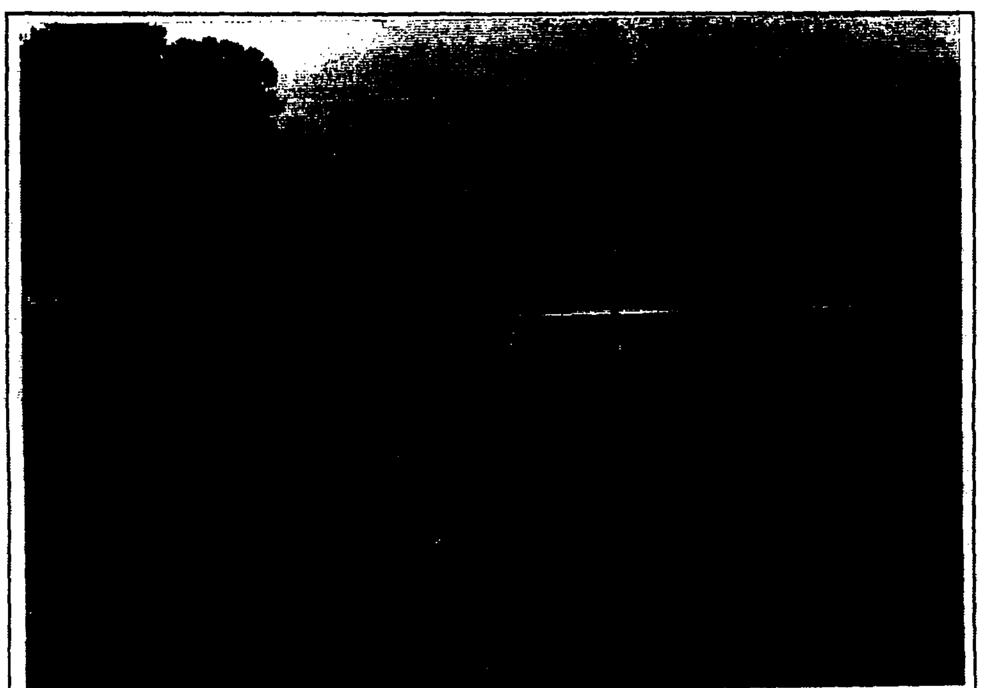
Drainage structure near major collapse area.

Photographer
Overfelt

Witness
Williams

Date/Time
7/26/90
1540 hours

Direction
Northwest



APPENDIX G

WELL LOGS FOR MONITORING WELLS

Ref. 9

HUDWALKER & ASSOCIATES, INC.
Engineers · Surveyors
P. O. Box 676
FARMINGTON, MO 63640

(314) 756-6775

LETTER OF TRANSMITTAL

DATE 11/12/97 JOB NO.

ATTENTION Mr. Bob Overfelt

RE Desloge Tailings Pile

TO Ecology & Environment, Inc.
6405 Metcalf
Building 3 - Suite 404
Overland Park, KS 66202

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via ______ the following items:

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ ______

COPIES	DATE	NO.	DESCRIPTION
1			Plan of Monitoring Well locations
1			Monitoring Well Detail

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit ____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit ____ copies for distribution
☒ As requested ☐ Returned for corrections ☐ Return ____ corrected prints
☐ For review and comment ☐ ______
☐ FOR BIDS DUE ______ 19 ____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS ______

COPY TO ______

SIGNED: [signature]

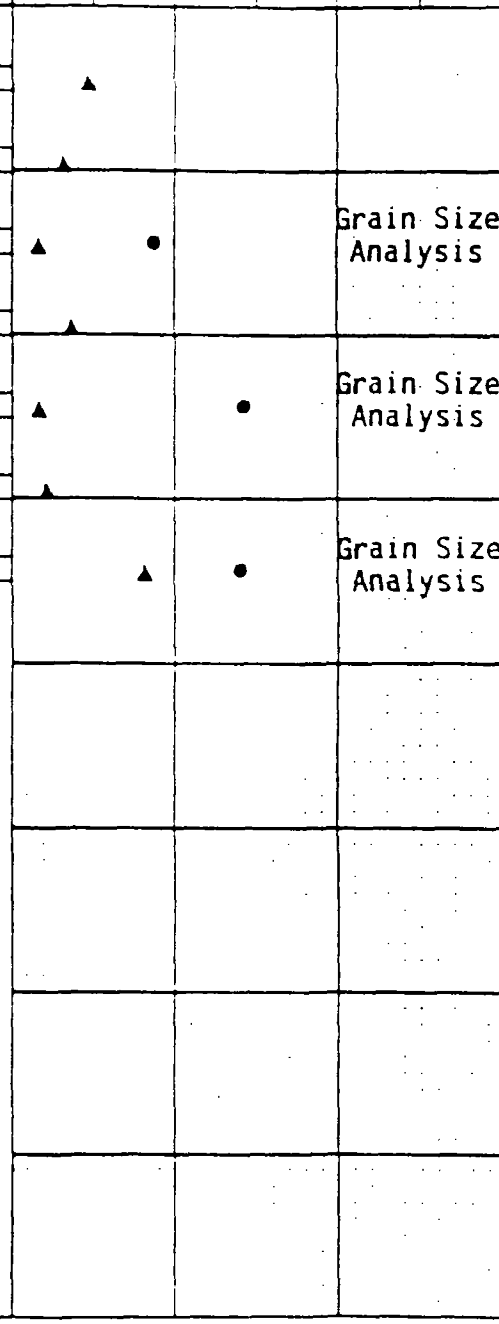
If enclosures are not as noted, kindly notify us at once.

Surface Elevation 780
Datum MSL

Completion Date 01/16/87

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT / SPT VALUE	SAMPLES	SHEAR STRENGTH, tsf (△ - UU/2, ○ - QU/2, ◇ - SV; 0.5, 1.0, 1.5, 2.0, 2.5) / STANDARD PENETRATION RESISTANCE (ASTM D 1586) ▲ - BLOWS PER FOOT / WATER CONTENT, % PL —●— LL (0, 20, 30, 40, 50)
0–25	Tan to gray, very loose to loose slightly silty fine SAND becoming gray and more silty below 14 feet		SS, SS, SS, SS	Grain Size Analysis
25–37.5	Intermixed gray, loose to medium dense, silty clayey SAND, to sandy clayey SILT		SS, SS, SS	Grain Size Analysis; Grain Size Analysis
37.5	Auger refusal on SANDY DOLOMITE at 37.5 feet			

Depth scale: 10, 20, 30, 40, 50, 60, 70



NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

GROUNDWATER DATA

ENCOUNTERED AT 23.5 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 9" HOLLOW STEM
____ WASH BORING FROM ____ FEET
MM DRILLER KDD LOGGER
CME 55 DRILL RIG

REMARKS. PVC monitoring well casing installed

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

UG-1

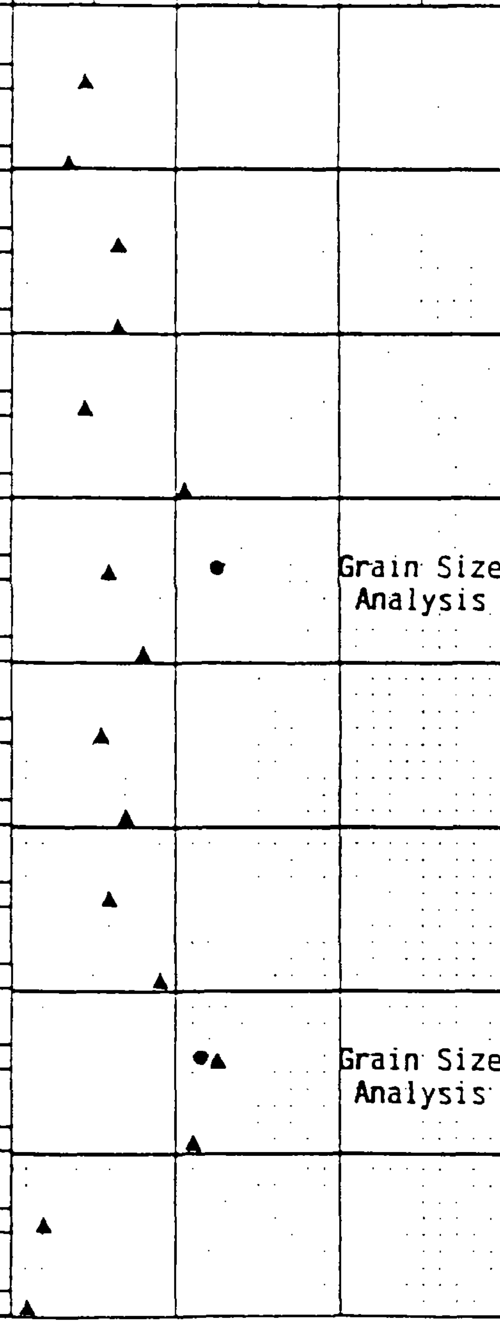
GEOTECHNOLOGY
St. Louis, Missouri

Surface Elevation 784
Datum MSL
Completion Date 01/16/87

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Tan, loose to medium dense, fine SAND with zones of gray clay up to 3"		SS
			SS
10			SS
			SS
20			SS
			SS
30	Gray, medium dense, silty SAND to sandy SILT with zones of gray, clay and silt		SS
40			SS
			SS
50	Gray, medium dense, silty to slightly clayey fine SAND		SS
			SS
60			SS
70			SS
	Gray, very loose, sandy and clayey SILT with green and black organics at 99 feet		SS
			SS

SHEAR STRENGTH, tsf
△ - UU/2 ○ - QU/2 ◇ - SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)
▲ - BLOWS PER FOOT
WATER CONTENT, %
PL LL
10 20 30 40 50



NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

GROUNDWATER DATA

ENCOUNTERED AT 34 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 9" HOLLOW STEM
____ WASH BORING FROM ____ FEET
MM DRILLER KDO LOGGER
CME 55 DRILL RIG

REMARKS: PVC monitoring well casing installed

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

DG-1

GEOTECHNOLOGY
St. Louis, Missouri

CONTINUATION OF BORING DG-1

SURFACE ELEVATION 784

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Gray, very loose, sandy and clayey SILT with green and black organics at 99 feet		SS
90			SS
			SS
100			SS
	TERMINATED AT 100' DUE TO INSTABILITY OF TAILINGS		
110			
120			
130			
140			
150			
160			
170			

SHEAR STRENGTH, tsf

△ - UU/2 ○ - QU/2 ◇ - SV

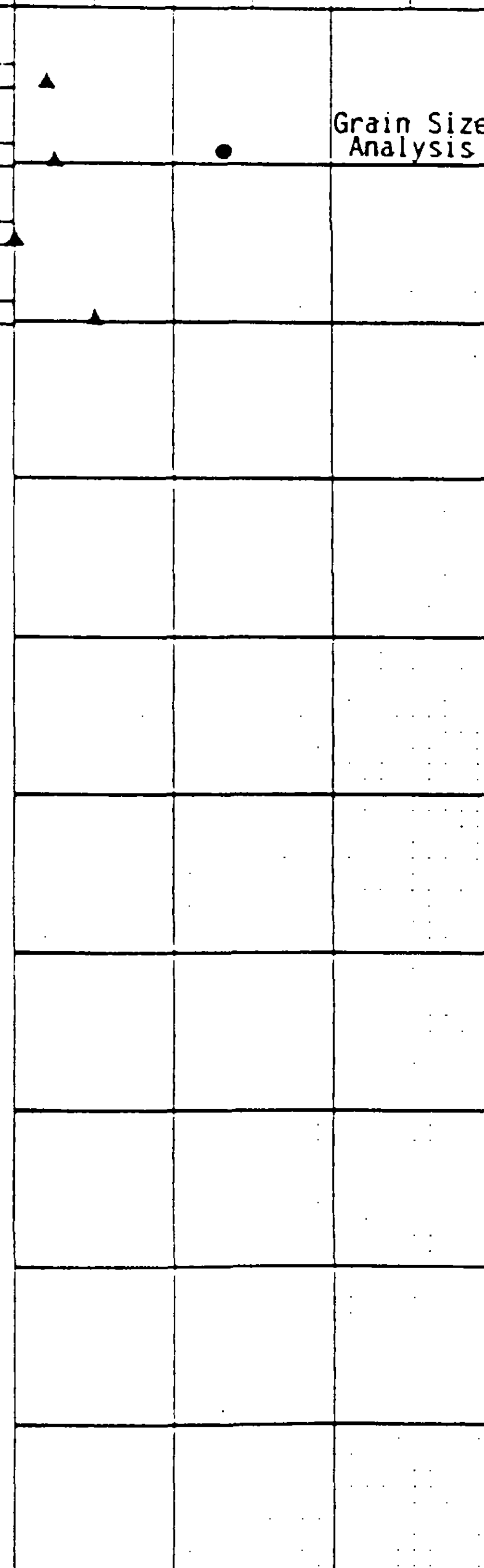
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)

▲ - BLOWS PER FOOT

PL ⊢ WATER CONTENT, % ⊣ LL

10 20 30 40 50



NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

GEOTECHNOLOGY
St. Louis, Missouri

Surface Elevation 794

Datum MSL

Completion Date 01/13/87

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
0–13.5	Gray, loose, SAND with zones of silty to clayey SAND		SS, SS
13.5–30	Gray, very loose, sandy to slightly clayey SILT		SS, SS, SS
30–30.5	Medium stiff, dark brown and gray, silty CLAY		SS, SS
	Split spoon refusal on SANDY DOLOMITE at 30.5 feet		

SHEAR STRENGTH, tsf

△ - UU/2 ○ - QU/2 ◇ - SV

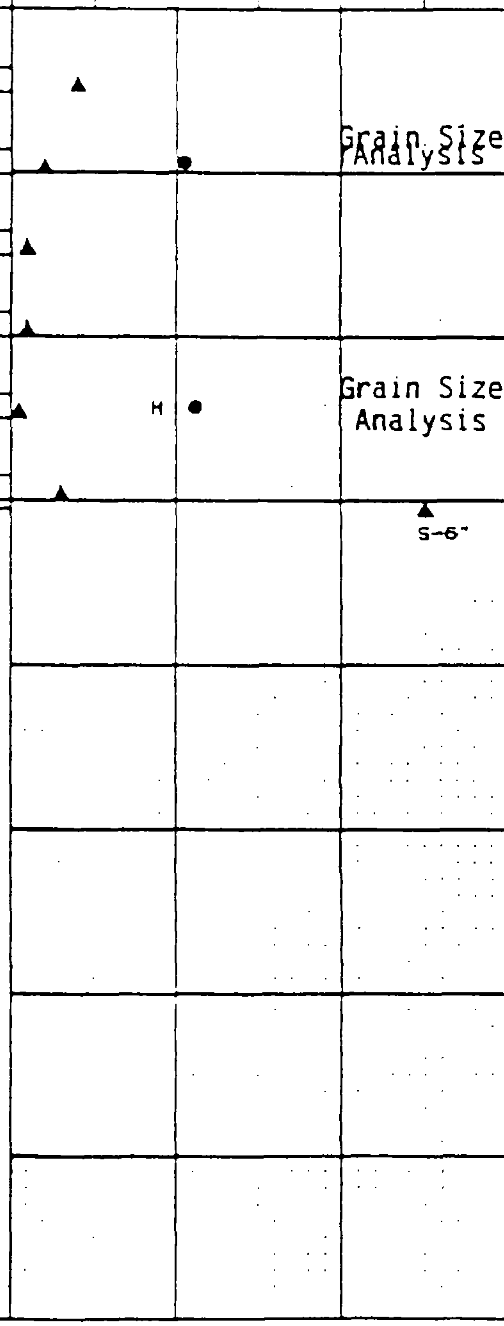
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)

▲ - BLOWS PER FOOT

PL ├── WATER CONTENT, % ──┤ LL

10 20 30 40 50



NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 13.5 FEET

AT ______ FEET AFTER ______ HOURS

AT ______ FEET AFTER ______ HOURS

____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 9" HOLLOW STEM

____ WASH BORING FROM ____ FEET

MM DRILLER KDD LOGGER

CME 55 DRILL RIG

REMARKS: PVC monitoring well casing installed

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

DG-2

GEOTECHNOLOGY

St. Louis, Missouri

Surface Elevation 784
Datum MSL

Completion Date 01/13/87

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Tan, loose to medium dense, fine to medium, SILT and silty SAND		SS
10			SS
			SS
20			SS
			SS
30			SS
			SS
40	Brown gray, loose, fine gravelly SAND with wood and black organics		SS
	Brown, medium stiff, silty CLAY with sandy DOLOMITE fragments		SS
50	Boring terminated at 45 feet		
60			
70			

SHEAR STRENGTH, tsf
△ - UU/2 ○ - QU/2 ◇ - SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)
▲ - BLOWS PER FOOT
WATER CONTENT, %
PL ● LL
10 20 30 40 50

Grain Size Analysis

Grain Size Analysis

Grain Size Analysis

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

GROUNDWATER DATA

ENCOUNTERED AT 33 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 9" HOLLOW STEM
____ WASH BORING FROM ____ FEET
MM DRILLER KDO LOGGER
CME 55 DRILL RIG

REMARKS: PVC monitoring well casing installed

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

DG-3

GEOTECHNOLOGY
St. Louis, Missouri

PROJECT ST. FRANCOIS COUNTY LANDFILL NO. 87307031

Surface Elevation 768
Datum MSL
Completion Date 01/19/87

SHEAR STRENGTH, tsf
△ - UU/2 ○ - QU/2 ◇ - SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)
▲ - BLOWS PER FOOT
WATER CONTENT, %
PL ⊢——●——⊣ LL
10 20 30 40 50

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES	
	Tan, loose to medium dense SAND		SS	
			SS	Grain Size Analysis
10			SS	
			SS	Grain Size Analysis
			SS	5-8"
20	Brown silty CLAY with dolomite fragments			
	Split spoon refusal at 29 feet			
30				
40				
50				
60				

NOTE. STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 24 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 9" HOLLOW STEM
____ WASH BORING FROM ____ FEET
MM DRILLER KDO LOGGER
CME 55 DRILL RIG

REMARKS. PVC monitoring well casing installed

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

DG-4

GEOTECHNOLOGY
St. Louis, Missouri

APPENDIX H

DETAILED TOPOGRAPHIC MAP OF THE BIG RIVER
MINE TAILINGS SITE

Unscanned Items

A map or maps that could not be scanned
exist with this document
or as a document
To view the maps, please contact the
Superfund Records Center

APPENDIX I

WASTE CHARACTERISTICS

Arsenic
Cadmium
Cobalt
Lead
Nickel
Zinc

WASTE CHARACTERISTICS

Arsenic (2/91)

Arsenic is a silver-gray, shiny, brittle, crystalline metal. It is used as an alloy additive for metals, in the manufacturing of certain types of glass, as a doping agent in geranium and silicon solid-state products in special solders, and medicine. Arsenic was used as a pesticide, but its use for this application has been discontinued (ITII 1979; Windholz 1976).

In water arsenic generally exists in the plus-three (As^{3+}) and plus-five (As^{5+}) oxidation states. It can also exist as metallic arsenic or in the minus-three (As^{3-}) state. Arsenic interchanges between the oxidation states and organic complexes. Under extremely reducing conditions, arsine (ArH_3) and methylated arsenic compounds are formed, and these compounds are volatile. However, in most environments this is not the case (EPA 1979).

Arsenic is adsorbed onto clays, aluminum, hydroxides, iron oxides, and organic material. It also can substitute for phosphate (As^{3-}) in phosphate minerals. Arsenic is most likely to be adsorbed in aerobic, acidic, freshwater environments. It is most mobile in reducing, alkaline, and saline conditions (EPA 1979).

The overall fate of arsenic is complex and cyclical around several fate processes. Not enough data has been gathered to determine the most dominant fate process (EPA 1979). Arsenic has been shown to bioaccumulate; although concentrations bioaccumulated are limited by arsenic's toxicity. The process of bioaccumulation is more likely to occur in the marine environment than in freshwater. Arsenic is biotransformed by methylation. This may be a mechanism whereby organisms detoxify this compound. Regardless, methylation increases the mobility of arsenic in the environment (EPA 1979).

Chronic arsenic exposure symptoms generally occur one to six weeks after onset of exposure. Symptoms include brown, dry dermatitis, hyperpigmentation, conjunctivitis, edema of eyelids, corneal neurosis, nasal irritation, dryness of throat, hoarseness, brittle nails, hair loss, numbness, burning, tingling of hands and feet, tremors, loss of muscle control, shuffling locomotion, and mental confusion. Chronic exposure to arsenic may also cause cancer. Gastrointestinal symptoms include nausea, vomiting, abdominal pain, diarrhea, enlarged liver, and jaundice. Many of these symptoms are also indicative of acute exposure, although acute symptoms begin within two days of exposure (ITII 1979; Windholz 1976).

The drinking water Maximum Contaminant Level (MCL) for arsenic is 50 μg/l. The freshwater chronic Lowest Observed Effect Level (LOEL) is 190 μg/l, indicating arsenic is somewhat toxic to aquatic life (EPA 1986a; EPA 1979).

The International Technical Information Institute, 1979, Toxic and Hazardous Industrial Chemicals Safety Manual, Tokyo, Japan.

U.S. Environmental Protection Agency, 1979, Water-Related Fate of 129 Priority Pollutants, Vol. 2, Washington, D.C.

U.S. Environmental Protection Agency, 1986, "Quality Criteria for Water."

Windholz, Martha, ed., 1976, The Merck Index, Rahway, New Jersey, Merck & Co., Inc.

WASTE CHARACTERISTICS (4/90)

Cadmium

Cadmium appears as a soft, blue-white malleable metal or as a grayish-white powder. It is combustible, and in powder form it is flammable. Cadmium is used for electroplating; in bearing and low melting point alloys, and in brazing alloys; in electrical equipment; in fire protection systems; in solar and storage batteries; in television phosphors; as a basis for pigment; in rubber and plastic products; to control atom fission in nuclear reactors; as a fungicide; and in photography and lithography processes. Cadmium also is used in the Weston Standard cell (ITII 1979; Windholz 1976).

Cadmium can exist in the aquatic environment as simple hydrated ions, as metal inorganic complexes, or as metal-organic complexes. It is less mobile in alkaline than in acidic environments because it precipitates; the concentration of cadmium in water is inversely related to the pH and the concentration of organic material. Cadmium complexes with humic substances and this phenomenon exerts the most control over the chemical state of cadmium. Cadmium also complexes with carbonates, which is the next important factor. Adsorption of cadmium onto mineral surfaces, hydrous metal oxides, and organic materials probably removes more cadmium from solution than precipitation, although this adsorption effects cadmium to a lesser extent than other heavy metals. All studies show that the concentration of cadmium in bed sediments is an order of magnitude higher than in overlying waters (EPA 1979). Cadmium may become an airborne contaminant if it is attached to soil or dust particles.

Cadmium is fairly toxic to both human and freshwater aquatic life. The Maximum Contaminant Level (MCL) for cadmium in drinking water is 10 µg/L; the freshwater chronic Lowest Observed Effect Level (LOEL) is 1.1 µg/L. Cadmium has been shown to bioaccumulate in aquatic life (EPA 1979; EPA 1986; EPA 1987).

Acute symptoms resulting from the inhalation of cadmium usually do not appear until 12 to 30 hours after exposure. These symptoms include headache, dizziness, and irritability; gastrointestinal disturbances;

severe chest pain and constriction, cough, shortness of breath, and pulmonary edema; and profuse sweating and fever. Chronic exposure symptoms are indicated by nose and throat inflammation, soreness, bleeding, and loss of sense of smell; sleeplessness; loss of appetite, nausea, and weight loss; damage to liver and anemia; yellow cadmium fringe on teeth; pulmonary emphysema; and fibrosis. Ingestion symptoms appear approximately 15 to 30 minutes after exposure and are characterized by salivation, nausea, vomiting, abdominal pain, diarrhea, dizziness, and unconsciousness (ITII 1979; Windholz 1976).

The International Technical Information Institute, 1979, Toxic and Hazardous Industrial Chemicals Safety Manual, Tokyo, Japan.

U.S. Environmental Protection Agency, 1979, Water Related Fate of 129 Priority Pollutants, Vol. 2, Washington, D.C.

U.S. Environmental Protection Agency, 1986, "Quality Criteria for Water."

U.S. Environmental Protection Agency, July 1987, "EPA Regulatory Status for Chemicals in Drinking Water."

Windholz, Martha, ed., 1976, The Merck Index, Merck & Co., Inc., Rahway, New Jersey.

WASTE CHARACTERISTICS (4/90)

Cobalt

Cobalt is a hard, gray, magnetic metal. It is stable to air and water at room temperature. Hydrated cobalt salts are red in color and produce red solutions when dissolved in liquids; these solutions turn blue upon addition of hydrochloric acid. Alloys of cobalt with nickel, aluminum, copper, beryllium, chromium, and molybdenum are used in the electrical, automobile, and aircraft industries. Permanent magnets are made from nickel-aluminum-cobalt alloys. Cobalt is also added to tool steels to improve their cutting qualities, and is added as a binder in the manufacture of tungsten carbide tools (Sittig 1985).

Normal valence states for cobalt are the +1, +2, and +3. Cobalt compounds are used as pigments in enamels, glazes, and paints; as catalysts in afterburners; in glass and pottery; and in the photographic and electroplating industries. Radioactive 60 Cobalt is used in cancer treatment. Previously, cobalt was added to beer to promote the formation of foam; however, cobalt acts with alcohol to produce severe cardiac effects in humans at concentrations as low as 1.2 to 1.5 mg of cobalt per liter of beer (Sittig 1985).

Human exposure to cobalt dust may result in pulmonary symptoms. Dermal contact with cobalt powder may produce dermatitis. Ingestion of the soluble cobalt salts can cause nausea and vomiting. Cobalt is an essential human nutrient. No freshwater aquatic Lowest Observed Effect Level (LOEL) or drinking water Maximum Contaminant Level (MCL) has been established for cobalt. Its concentration in natural waters and in drinking water is generally an order of magnitude below that which causes any adverse health effects (Sittig 1985).

Sittig, Marshall, 1985, Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd. ed., Noyes Publications, Park Ridge, New Jersey.

Lead

Lead is a soft, bluish-white, silvery-gray metal. It has numerous uses including as a construction material for lining tanks, pipes, and other equipment that handles corrosive gases and liquids; in petroleum refining; in pigments for paints; in metal alloys, storage batteries, and ceramics; and in plastics (Windholz 1976). Lead also is used as a shielding material for x-rays and atomic radiation (Sittig 1985).

Automobile exhaust contains halogenated lead products such as lead chloride and bromide, which are photooxidized in the atmosphere. This process forms lead oxide by releasing the halogen (EPA 1979). Lead is more mobile in acidic and weakly acid oxidizing environments than in neutral and alkaline waters (Perel'man 1967). Lead generally exists in the aqueous environment in the divalent state. Its solubility is controlled by the concentrations of anions such as carbonate, hydroxide, sulfide, and sulfate. Organic complexes with humic acids are stable to pH 3. Bacteria transform inorganic lead into organic lead compounds such as tetramethyl lead, which is volatile. This phenomenon is significant in the environmental transport process for lead; it allows lead that is sorbed to bed sediments to partition into the aqueous or atmospheric phases. Lead is sorbed to soil and sediment organic matter. However, the degree of sorption depends on the initial lead concentration and the presence of other complexes; the geologic setting and the type of surrounding soil and sediment; the pH, Eh, and salinity; and the dissolved and particulate iron concentration. Lead is bioaccumulated, but most natural waters make lead relatively unavailable for uptake by aquatic biota (EPA 1979).

Lead is very toxic, especially to young children in whom exposure may cause permanent brain damage (Windholz 1976). Early exposure symptoms include decreased physical fitness, fatigue, and sleep disorders; headache and aching bones and muscles; abdominal pain, and decreased appetite. Chronic exposure leads to anemia, skin pallor, lead line on gums, decreased handgrip strength, and kidney damage. Acute ingestion and inhalation of large amounts of lead can cause severe headache, convulsion, coma, and death (Sittig 1985). The current drinking water Maximum Contaminant Level (MCL) for lead is 50 μg/l. The proposed MCL is 5 μg/l at the beginning of the water distribution system and 10 μg/l at the tap (EPA 1987; 1988). The chronic freshwater Lowest Observed Effect Level (LOEL) is 3.2 μg/l (EPA 1986).

Bibliography

Perel'man, Alexsandr I., 1967, Geochemistry of Epigenesis, Plenum Press, New York, New York.

Sittig, Marshall, 1985, Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd. ed., Noyes Publications, Park Ridge, New Jersey.

U.S. Environmental Protection Agency, 1979, Water Related Fate of 129 Priority Pollutants, Vol. 2, Washington, D.C.

U.S. Environmental Protection Agency, 1986, "Quality Criteria for Water."

U.S. Environmental Protection Agency, July 1987, "EPA Regulatory Status for Chemicals in Drinking Water."

U.S. Environmental Protection Agency, August 18, 1988, "Drinking Water Regulations and Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, Federal Register," Vol. 53, No. 16.

Windholz, Martha, ed., 1976, The Merck Index, Rahway, New Jersey, Merck & Co., Inc.

Nickel

Nickel is a hard, ductile, magnetic, insoluble metal which exists as silvery-white cubic solids. It is used in the manufacture of steel and other alloys; and is a component of coins, ceramics, storage batteries, electrical circuits, and colored glass. Nickel is also used as a hardener for edible oils, and as a catalyst in other chemical reactions. Two processes are used to produce nickel: the Oxford process uses sodium sulfide and electrolysis; the Mond process reacts nickel powder with carbon monoxide to produce nickel carbonyl. The nickel carbonyl is then treated to deposit metallic nickel (Sittig 1985).

Nickel occurs free in meteorites and in ores combines with sulfur, antimony, and arsenic. Nickel is divalent in aquatic systems. It is the most mobile of all the heavy metals. In aquatic systems below pH 9.0, nickel is soluble; above pH 9.0 it precipitates as carbonates and hydroxides. Nickel forms soluble complexes with fulvic and humic acids present in natural waters, a characteristic that increases its mobility in the aquatic environment. It can be sorbed onto hydrous iron and magnesium oxides in organic material, but sorption is likely to inhibit the mobility of nickel only in unpolluted waters (EPA 1979).

The nickel refining process is considered carcinogenic to humans. Epidemiologic studies show a higher incidence of nasal cavity and lung cancers in nickel refinery workers. Other nickel compounds are known to produce cancer in rats, mice, and hamsters. It is not known which specific nickel compounds are carcinogenic. However, evidence suggests that the toxicity and carcinogenic risk posed by a metal is more a property of the metal than of its specific form. Therefore, because some nickel compounds are carcinogenic, all nickel compounds are suspected carcinogens (DHHS 1985). Non-carcinogenic exposure effects include 'nickel itch', chronic eczema, and eye and upper respiratory tract irritation (Sittig 1985).

Other potential exposures to nickel occur through cigarette smoke; emissions from coal and ore-fired boilers, coke ovens, and grey iron foundries; and from burning diesel fuel. Nickel can also be leached from nickel alloys during food processing (Sittig 1985).

There is no drinking water Maximum Contaminant Level (MCL) for nickel. Most natural waters contain less than 10 µg/l. The freshwater chronic lowest observed effect level (LOEL) for nickel is 96 µg/l (EPA 1986). Generally, freshwater bioconcentration factors range from 40 to 100 and are less than 10^3 (EPA 1979).

Bibliography

Sittig, Marshall, 1985, Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd. ed., Noyes Publications, New Jersey.

U.S. Department of Health and Human Services, 1985, Fourth Annual Report on Carcinogens Summary, Public Health Service, Washington, D.C.

U.S. Environmental Protection Agency, Water-Related Fate of 129 Priority Pollutants, Vol. 2, Washington, D.C.

U.S. Environmental Protection Agency, 1986, "Water Quality Criteria for Water."

WASTE CHARACTERISTICS
Zinc

Zinc is a bluish-white, lustrous metal used in metal refining, dye manufacturing, rustproofing paints, electroplating, and for galvanizing iron and other metals (ITII 1979; Windholz 1976). Like lead, zinc is more mobile in acidic and mildly acidic waters than in neutral or basic waters.

Zinc is a nutritional trace element (Windholz 1976). It has a recommended drinking water Maximum Contaminant Level (MCL) of 5,000 µg/l. This value is recommended because zinc levels above this concentration impart a metallic taste to drinking water. Drinking water concentrations of up to 40,000 µg/l of zinc do not cause deleterious health effects in humans. However, 20 µg/l zinc is toxic to fish (Freeze and Cherry 1979). Zinc fumes are toxic when inhaled, causing throat dryness, coughing, weakness, dizziness, achiness, chills, fever, nausea, and vomiting (Windholz 1976).

Freeze, Allen R. and John A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

International Technical Information Institute, 1979, Toxic and Hazardous Industrial Chemicals Safety Manual, Tokyo, Japan.

Windholz, Martha, ed., 1976, The Merck Index, Rahway, New Jersey, Merck & Co., Inc.

APPENDIX J

AIR CALCULATIONS AND WIND ROSES

EXPLANATION OF STANDARD VOLUME OF AMBIENT AIR

The initial flow rate (QRI), final flow rate (QRF), and average flow rate (QR) of each Hi-Vol air sampler was calculated for each day of sampling in Ref. 33, p. 2. The flow rates of the Hi-Vol samplers were calculated in the field and recorded in the air sampling log book under QR (Ref. 38, pp. 2-17). The initial flow rate (QRI) for the first day of sampling that is recorded in Ref. 33, p. 2, is the same as the flow rate (QR) for the first day of sampling that is recorded in Ref. 38, pp. 2-17. The final flow rate (QRF) for the first day of sampling that is recorded in Ref. 33, p. 2, is the same as the flow rate (QR) for the second day of sampling that is recorded in Ref. 38, pp. 2-17. In other words, the final flow rate for the first day of sampling is the same as the initial flow rate for the second day of sampling. The final flow rate for the last day of sampling (July 28) is recorded as QR in Ref. 38a, pp. 2-8. The average flow rate (QR) in Ref. 33, p. 2, is calculated by averaging the QRI and QRF.

The total sample time (in minutes) for every sample is recorded in Ref. 38, pp. 2-17, and it is also recorded as 't' in Ref. 33, p. 2. The temperature (in degrees Celsius) for every day of sampling is recorded in Ref. 38, pp. 2-17, and it is also recorded as 'Ta' in Ref. 33, p. 2. The barometric pressure (in mm. Hg) is recorded in Ref. 38, pp. 2-17, and it is converted to in. Hg and recorded as 'Pa' in Ref. 33, p. 2.

The volume of ambient air (Vs) and the Standard volume of ambient air (Vstd) that flowed through each sample is calculated in Ref. 33, p. 2. The equation for Vs is:

$$Vs = QR \times t$$

The equation for Vstd is:

$$Vstd = Vs \times 25.4 \times Pa / 760 \times (298 / \langle Ta + 273 \rangle)$$

The values 25.4, 760, 298, and 273 are constants. Ref. 33, p. 3 explains how the Standard volume of ambient air is used to calculate the concentration of heavy metals in the air samples.

TABLE F1: CALCULATIONS OF STANDARD VOLUMES OF AMBIENT AIR BIG RIVER MINE TAILINGS

DATE 1990	SAMPLE #	t min	Ta deg.C	Pa in.Hg	DRI CMM	DRF CMM	DR CMM	Vs cu.M	Vstd cu.M
7/23	BR-AM-01-1	745.1	20.9	29.62	1.135	1.417	1.276	950.75	954.37
	BR-AM-02-1	737.6	20.9	29.62	1.135	1.417	1.276	941.18	944.76
	BR-AM-03-1	701.5	20.9	29.62	1.135	1.417	1.276	895.11	898.53
	BR-AM-04-1	713.0	20.9	29.62	1.135	1.417	1.276	909.73	913.26
	BR-AM-05-1	———	20.9	29.62	1.135	1.417	1.276	0.00	0.00
	BR-AM-06-1	———	20.9	29.62	1.135	1.417	1.276	0.00	0.00
	BR-AM-07-1	726.3	20.9	29.62	1.135	1.417	1.276	926.76	930.29
	BR-AM-08-1	750.0	20.9	29.62	1.135	1.417	1.276	957.04	960.63
7/24	BR-AM-01-2	725.1	23.6	29.65	1.417	1.415	1.416	1026.74	1022.41
	BR-AM-02-2	714.9	23.6	29.65	1.417	1.415	1.416	1012.30	1008.02
	BR-AM-03-2	693.8	23.6	29.65	1.417	1.415	1.416	982.42	978.27
	BR-AM-04-2	742.2	23.6	29.65	1.417	1.415	1.416	1050.96	1046.52
	BR-AM-05-2	750.9	23.6	29.65	1.417	1.415	1.416	1063.27	1058.79
	BR-AM-06-2	718.9	23.6	29.65	1.417	1.415	1.416	1017.96	1013.66
	BR-AM-07-2	709.6	23.6	29.65	1.417	1.415	1.416	1004.79	1000.55
	BR-AM-08-2	720.0	23.6	29.65	1.417	1.415	1.416	1019.52	1015.22
7/25	BR-AM-01-3	715.1	24.8	29.68	1.415	1.415	1.415	1011.87	1004.51
	BR-AM-02-3	723.3	24.8	29.68	1.415	1.415	1.415	1023.47	1016.03
	BR-AM-03-3	699.3	24.8	29.68	1.415	1.415	1.415	989.51	982.32
	BR-AM-04-3	———	24.8	29.68	1.415	1.415	1.415	0.00	0.00
	BR-AM-05-3	714.3	24.8	29.68	1.415	1.415	1.415	1010.73	1003.39
	BR-AM-06-3	716.5	24.8	29.68	1.415	1.415	1.415	1013.85	1006.48
	BR-AM-07-3	740.7	24.8	29.68	1.415	1.415	1.415	1048.09	1040.47
	BR-AM-08-3	720.0	24.8	29.68	1.415	1.415	1.415	1018.80	1011.40
7/26	BR-AM-01-4	770.6	25.5	29.74	1.415	1.414	1.415	1090.01	1081.64
	BR-AM-02-4	726.1	25.5	29.74	1.415	1.414	1.415	1027.07	1019.37
	BR-AM-03-4	681.7	25.5	29.74	1.415	1.414	1.415	964.26	957.03
	BR-AM-04-4	719.6	25.5	29.74	1.415	1.414	1.415	1017.87	1010.24
	BR-AM-05-4	782.4	25.5	29.74	1.415	1.414	1.415	1106.70	1098.41
	BR-AM-06-4	746.2	25.5	29.74	1.415	1.414	1.415	1055.50	1047.58
	BR-AM-07-4	715.1	25.5	29.74	1.415	1.414	1.415	1011.51	1003.52
	BR-AM-08-4	720.0	25.5	29.74	1.415	1.414	1.415	1018.44	1010.80
7/27	BR-AM-01-5	719.0	25.6	29.74	1.414	1.409	1.412	1014.87	1006.68
	BR-AM-02-5	701.8	25.6	29.74	1.414	1.409	1.412	990.59	982.60
	BR-AM-03-5	702.2	25.6	29.74	1.414	1.409	1.412	991.16	983.16
	BR-AM-04-5	731.7	25.6	29.74	1.414	1.409	1.412	1032.79	1024.47
	BR-AM-05-5	782.4	25.6	29.74	1.414	1.409	1.412	1104.36	1095.45
	BR-AM-06-5	744.0	25.6	29.74	1.414	1.409	1.412	1050.16	1041.63
	BR-AM-07-5	747.0	25.6	29.74	1.414	1.409	1.412	1054.39	1045.89
	BR-AM-08-5	721.8	25.6	29.74	1.414	1.409	1.412	1018.78	1010.56
7/28	BR-AM-01-6	716.9	27.3	29.74	1.409	1.133	1.271	911.18	898.78
	BR-AM-02-6	699.1	27.3	29.74	1.409	1.133	1.271	888.56	876.46
	BR-AM-03-6	780.0	27.3	29.74	1.409	1.133	1.271	991.38	977.88
	BR-AM-04-6	707.0	27.3	29.74	1.409	1.133	1.271	898.60	886.36
	BR-AM-05-6	773.4	27.3	29.74	1.409	1.133	1.271	982.99	969.61
	BR-AM-06-6	733.2	27.3	29.74	1.409	1.133	1.271	931.90	919.21
	BR-AM-07-6	690.8	27.3	29.74	1.409	1.133	1.271	878.01	866.05
	BR-AM-08-6	721.0	27.3	29.74	1.409	1.133	1.271	916.39	903.92

Conversion of pressure from mm Hg to Inches

mm	Inches
752.40	29.62
753.16	29.65
753.92	29.68
755.44	29.74
755.44	29.74
754.68	29.71

EXPLANATION OF AIR DATA CALCULATIONS

The concentration of heavy metals in the air samples is calculated by first subtracting the concentration of a specific heavy metal in the daily field blank from the concentration of the same heavy metal in a sample. For example, the concentration of Lead in CSXCR412 is 840 ug/filter. The concentration of lead in the daily field blank is 1.1 ug/filter. The field blank concentration is subtracted from the sample concentration for a value of 838.9 ug/filter.

This value is then divided by the standard volume of ambient air (Stdv) that flowed through the sample (1046.52 cubic meters/ filter for CSXCR412). The final calculated concentration of lead for the sample is .802 ug/cubic meter. All of the sample concentrations have been rounded to the third decimal place.

The concentration of heavy metals in the daily field blanks was usually below the sample quantitation limit (SQL). The SQL is is designated in the analytical data by a U code, and the associated value is the quantitation limit. When this was the case, half of the sample quantitation limit was assigned as the daily field blank concentration.

Ref. #33 p. 4 of 15

BIG RIVER MINE TAILINGS, PAN# FMDO616HBA

TABLE 1: ORIGINAL DATA (UG/FILTER)

DAY # 1 7/23/90	(BLANK) BR-AM-08 CSXCR408	BR-AM-01 CSXCR400	BR-AM-02 CSXCR402	BR-AM-03 CSXCR403	BR-AM-04 CSXCR404	BR-AM-05 CSXCR405	BR-AM-06 CSXCR406	BR-AM-07 CSXCR407
Aluminum	20.00	73.00	90.00	83.00	340.00	*****	160.00	67.00
Antimony	6.00	12.00	12.00	12.00	12.00	*****	12.00	12.00
Arsenic	1.00	2.00	2.00	2.00	3.50	*****	2.00	2.00
Barium	20.00	40.00	40.00	40.00	7.90	*****	40.00	40.00
Beryllium	0.50	1.00	1.00	1.00	1.00	*****	1.00	1.00
Boron	******	*****	*****	*****	*****	*****	*****	*****
Cadmium	0.50	1.00	1.00	1.00	6.10	*****	2.30	1.00
Calcium	500.00	1000.00	1300.00	1000.00	15000.00	*****	1600.00	1000.00
Chromium	1.00	2.00	2.00	2.10	1.80	*****	2.10	2.00
Cobalt	5.00	10.00	10.00	10.00	10.00	*****	10.00	10.00
Copper	2.50	97.00	66.00	81.00	44.00	*****	150.00	140.00
Iron	22.00	140.00	170.00	120.00	2600.00	*****	250.00	120.00
Lead	0.50	7.80	19.00	14.00	580.00	*****	62.00	8.00
Magnesium	500.00	1000.00	1000.00	1000.00	7800.00	*****	1000.00	1000.00
Manganese	1.50	9.30	11.00	6.70	320.00	*****	15.00	7.00
Mercury	*****	*****	*****	*****	*****	*****	*****	*****
Molybdenum	*****	*****	*****	*****	*****	*****	*****	*****
Nickel	5.00	10.00	10.00	10.00	10.00	*****	10.00	10.00
Potassium	500.00	1000.00	1000.00	1000.00	1000.00	*****	1000.00	1000.00
Selenium	0.50	1.20	1.60	1.50	1.00	*****	1.00	1.00
Silicon	*****	*****	*****	*****	*****	*****	*****	*****
Silver	1.00	2.00	2.00	2.00	2.00	*****	2.00	2.00
Sodium	500.00	1000.00	1000.00	1000.00	1000.00	*****	1000.00	1000.00
Thallium	1.00	2.00	2.00	2.00	2.00	*****	2.00	2.00
Vanadium	5.00	10.00	10.00	10.00	10.00	*****	10.00	10.00
Zinc	2.00	15.00	20.00	12.00	240.00	*****	44.00	16.00
CU.M./FILTER	*	954.37	944.76	898.53	913.26	0.00	0.00	930.29

/015 BIG RIVER MINE TAILINGS. PRN# FMO0616HB

TABLE 2: CONCENTRATION IN AIR (UG/CU.M)

DAY # 1 7/23/90	(BLANK) BR-AM-08 CSXCR408	BR-AM-01 CSXCR400	BR-AM-02 CSXCR402	BR-AM-03 CSXCR403	BR-AM-04 CSXCR404	BR-AM-05 CSXCR405	BR-AM-06 CSXCR406	BR-AM-07 CSXCR407
Aluminum	*	0.062	0.074	0.070	0.350	ERR	ERR	0.051
Antimony	*	0.006	0.006	0.007	0.007	ERR	ERR	0.006
Arsenic	*	0.001	0.001	0.001	0.003	ERR	ERR	0.001
Barium	*	0.021	0.021	0.022	-0.013	ERR	ERR	0.021
Beryllium	*	0.001	0.001	0.001	0.001	ERR	ERR	0.001
Boron	*	0.000	0.000	0.000	0.000	ERR	ERR	0.000
Cadmium	*	0.001	0.001	0.001	0.006	ERR	ERR	0.001
Calcium	*	0.524	0.847	0.526	15.877	ERR	ERR	0.537
Chromium	*	0.001	0.001	0.001	0.001	ERR	ERR	0.001
Cobalt	*	0.005	0.005	0.006	0.005	ERR	ERR	0.005
Copper	*	0.099	0.067	0.087	0.045	ERR	ERR	0.148
Iron	*	0.124	0.157	0.103	2.823	ERR	ERR	0.105
Lead	*	0.008	0.020	0.015	0.569	ERR	ERR	0.008
Magnesium	*	0.524	0.523	0.556	7.993	ERR	ERR	0.537
Manganese	*	0.008	0.010	0.006	0.349	ERR	ERR	0.006
Mercury	*	0.000	0.000	0.000	0.000	ERR	ERR	0.000
Molybdenum	*	0.000	0.000	0.000	0.000	ERR	ERR	0.000
Nickel	*	0.005	0.005	0.006	0.005	ERR	ERR	0.005
Potassium	*	0.524	0.523	0.526	0.547	ERR	ERR	0.537
Selenium	*	0.001	0.001	0.001	0.001	ERR	ERR	0.001
Silicon	*	0.000	0.000	0.000	0.000	ERR	ERR	0.000
Silver	*	0.001	0.001	0.001	0.001	ERR	ERR	0.001
Sodium	*	0.524	0.529	0.556	0.547	ERR	ERR	0.537
Thallium	*	0.001	0.001	0.001	0.001	ERR	ERR	0.001
Vanadium	*	0.005	0.005	0.006	0.005	ERR	ERR	0.005
Zinc	*	0.014	0.019	0.011	0.261	ERR	ERR	0.015

Ref. #33 p. 6 of 15

7015 BIG RIVER MINE TAILINGS. FMO0615HAA
TABLE 1: ORIGINAL DATA (UG/FILTER)

DAY # 2	(BLANK)							
7/24/90	BR-AM-08-2	BR-AM-01	BR-AM-02	BR-AM-03	BR-AM-04	BR-AM-05	BR-AM-06	BR-AM-07
	CSXCR416	CSXCR409	CSXCR410	CSXCR411	CSXCR412	CSXCR413	CSXCR414	CSXCR415
Aluminum	20.00	40.00	140.00	160.00	580.00	140.00	120.00	58.00
Antimony	6.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Arsenic	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Barium	20.00	40.00	40.00	40.00	40.00	12.00	3.20	40.00
Beryllium	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron	#####	#####	#####	#####	#####	#####	#####	#####
Cadmium	0.50	1.10	1.00	1.10	8.50	1.40	1.50	1.00
Calcium	500.00	1500.00	2200.00	2300.00	24000.00	1200.00	1000.00	1000.00
Chromium	1.00	2.00	2.00	2.00	2.40	2.00	2.00	2.00
Cobalt	5.00	10.00	10.00	10.00	6.50	10.00	10.00	10.00
Copper	2.50	110.00	120.00	83.00	67.00	120.00	100.00	190.00
Iron	10.00	230.00	320.00	430.00	4300.00	310.00	190.00	130.00
Lead	1.10	32.00	47.00	57.00	840.00	58.00	28.00	21.00
Magnesium	500.00	1300.00	3100.00	1300.00	12000.00	1000.00	250.00	1000.00
Manganese	1.50	16.00	23.00	33.00	530.00	17.00	11.00	6.60
Mercury	#####	#####	#####	#####	#####	#####	#####	#####
Molybdenum	#####	#####	#####	#####	#####	#####	#####	#####
Nickel	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Potassium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	190.00	1000.00
Selenium	0.50	1.60	1.20	1.40	1.00	1.70	1.20	1.20
Silicon	#####	#####	#####	#####	#####	#####	#####	#####
Silver	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Sodium	500.00	1000.00	1000.00	1000.00	230.00	1000.00	250.00	1000.00
Thallium	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Vanadium	5.00	10.00	10.00	10.00	2.10	10.00	10.00	10.00
Zinc	2.00	27.00	30.00	36.00	400.00	63.00	22.00	24.00
CU.M./FILTE	*	1022.41	1008.02	978.27	1046.52	1058.73	1013.66	1000.55

Ref. # 33 p. 7 of

✓015 BIG RIVER MINE TAILINGS. PAN# FMO0616HB

TABLE 2: CONCENTRATION IN AIR (UG/CU.M)

DAY # 2 7/24/90	(BLANK) BR-AM-08(B CSIXCR416	BR-AM-01 CSIXCR409	BR-AM-02 CSIXCR410	BR-AM-03 CSIXCR411	BR-AM-04 CSIXCR412	BR-AM-05 CSIXCR413	BR-AM-06 CSIXCR414	BR-AM-07 CSIXCR415
Aluminum	*	0.020	0.119	0.143	0.535	0.113	0.099	0.038
Antimony	*	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Arsenic	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Barium	*	0.020	0.020	0.020	0.019	-0.008	-0.017	0.020
Beryllium	*	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Boron	*	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Cadmium	*	0.001	0.000	0.001	0.008	0.001	0.001	0.000
Calcium	*	0.578	1.686	1.840	22.455	0.661	0.493	0.500
Chromium	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cobalt	*	0.005	0.005	0.005	0.001	0.005	0.005	0.005
Copper	*	0.105	0.117	0.082	0.062	0.111	0.096	0.187
Iron	*	0.215	0.308	0.429	4.093	0.283	0.178	0.120
Lead	*	0.030	0.046	0.057	0.802	0.054	0.027	0.020
Magnesium	*	1.369	2.579	1.431	10.989	0.472	-0.237	0.500
Manganese	*	0.014	0.021	0.032	0.505	0.015	0.009	0.005
Mercury	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Molybdenum	*	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Nickel	*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Potassium	*	0.489	0.496	0.511	0.478	0.472	-0.306	0.500
Selenium	*	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silicon	*	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Silver	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Sodium	*	0.489	0.496	0.511	-0.258	0.472	-0.247	0.500
Thallium	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Vanadium	*	0.005	0.005	0.005	-0.003	0.005	0.005	0.005
Zinc	*	0.024	0.028	0.035	0.380	0.058	0.020	0.022

Ref. #33 p. 8 of 15

/015 BIG RIVER MINE TAILINGS, [illegible]

TABLE 1: ORIGINAL DATA (UG/FILTER)

DAY # 3 7/25/90	(BLANK) BR-AM-08 CSXCR424	BR-AM-01 CSXCR417	BR-AM-02 CSXCR418	BR-AM-03 CSXCR419	BR-AM-04 CSXCR420	BR-AM-05 CSXCR421	BR-AM-06 CSXCR422	BR-AM-07 CSXCR423
Aluminum	20.00	200.00	230.00	220.00	330.00	150.00	130.00	110.00
Antimony	6.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Arsenic	1.00	2.00	2.00	2.00	6.00	2.00	2.00	2.00
Barium	20.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Beryllium	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron	#####	#####	#####	#####	#####	#####	#####	#####
Cadmium	0.50	1.50	1.70	3.00	12.00	1.00	1.00	1.00
Calcium	500.00	1200.00	1400.00	1900.00	37000.00	1600.00	1100.00	1000.00
Chromium	1.00	2.00	2.00	2.10	2.90	2.00	2.00	2.00
Cobalt	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Copper	2.50	270.00	110.00	49.00	91.00	110.00	76.00	220.00
Iron	10.00	330.00	370.00	450.00	6800.00	360.00	310.00	180.00
Lead	2.70	14.00	26.00	46.00	1400.00	130.00	23.00	8.60
Magnesium	500.00	1000.00	1000.00	1400.00	18000.00	1000.00	1000.00	1000.00
Manganese	1.50	22.00	25.00	30.00	730.00	24.00	18.00	10.00
Mercury	#####	#####	#####	#####	#####	#####	#####	#####
Molybdenum	#####	#####	#####	#####	#####	#####	#####	#####
Nickel	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Potassium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Selenium	0.50	1.90	2.20	2.50	3.50	2.00	2.10	2.00
Silicon	#####	#####	#####	#####	#####	#####	#####	#####
Silver	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Sodium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Thallium	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Vanadium	5.00	3.10	10.00	10.00	10.00	10.00	10.00	10.00
Zinc	2.00	28.00	27.00	37.00	560.00	33.00	22.00	36.00
CU.M./FILTE	*	1004.51	1016.03	382.32	0.00	1003.39	1006.48	1040.47

/015 BIG RIVER MINE TAILINGS, SAND FMO0616HBA

TABLE 2: CONCENTRATION IN AIR (UG/CU.M)

DAY # 3 (BLANK)

7/25/90	BR-AM-08 CSXCR424	BR-AM-01 CSXCR417	BR-AM-02 CSXCR418	BR-AM-03 CSXCR419	BR-AM-04 CSXCR420	BR-AM-05 CSXCR421	BR-AM-06 CSXCR422	BR-AM-07 CSXCR423
Aluminum	* -	0.173	0.207	0.204	ERR	0.130	0.169	0.086
Antimony	*	0.006	0.006	0.006	ERR	0.006	0.006	0.006
Arsenic	* -	0.001	0.001	0.001	ERR	0.001	0.001	0.001
Barium	*	0.020	0.020	0.020	ERR	0.020	0.020	0.019
Beryllium	*	0.000	0.000	0.001	ERR	0.000	0.000	0.000
Boron	*	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Cadmium	*	0.001	0.001	0.003	ERR	0.000	0.000	0.000
Calcium	*	0.697	0.886	1.425	ERR	1.096	0.596	0.481
Chromium	*	0.001	0.001	0.001	ERR	0.001	0.001	0.001
Cobalt	*	0.005	0.005	0.005	ERR	0.005	0.005	0.005
Copper	* -	0.266	0.106	0.047	ERR	0.107	0.073	0.209
Iron	* -	0.319	0.354	0.448	ERR	0.349	0.238	0.163
Lead	* -	0.011	0.023	0.044	ERR	0.127	0.020	0.006
Magnesium	* -	0.498	0.492	0.916	ERR	0.498	0.497	0.481
Manganese	* -	0.020	0.023	0.029	ERR	0.022	0.016	0.008
Mercury	* -	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Molybdenum	* -	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Nickel	*	0.005	0.005	0.005	ERR	0.005	0.005	0.005
Potassium	*	0.498	0.492	0.509	ERR	0.498	0.497	0.481
Selenium	*	0.001	0.002	0.002	ERR	0.001	0.002	0.001
Silicon	*	0.000	0.000	0.000	ERR	0.000	0.000	0.000
Silver	*	0.001	0.001	0.001	ERR	0.001	0.001	0.001
Sodium	*	0.498	0.492	0.509	ERR	0.498	0.497	0.481
Thallium	*	0.001	0.001	0.001	ERR	0.001	0.001	0.001
Vanadium	*	-0.002	0.005	0.005	ERR	0.005	0.005	0.005
Zinc	*	0.026	0.025	0.036	ERR	0.031	0.020	0.033

/015 BIG RIVER MINE TAILINGS, PAN# FMO0616HB
TABLE 1: ORIGINAL DATA (UG/FILTER)

DAY # 4 7/26/90	(BLANK) BR-AM-08 CSXCRA32	BR-AM-01 CSXCRA25	BR-AM-02 CSXCRA26	BR-AM-03 CSXCRA27	BR-AM-04 CSXCRA28	BR-AM-05 CSXCRA29	BR-AM-06 CSXCRA30	BR-AM-07 CSXCRA31
Aluminum	6.90	130.00	140.00	160.00	610.00	160.00	160.00	110.00
Antimony	6.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Arsenic	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Barium	20.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Beryllium	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron	#####	#####	#####	#####	#####	#####	#####	#####
Cadmium	0.50	1.20	1.40	1.30	3.20	1.00	1.40	1.00
Calcium	500.00	1500.00	1400.00	2500.00	28000.00	1100.00	1000.00	1000.00
Chromium	1.00	2.00	2.00	2.00	3.10	2.00	2.00	2.00
Cobalt	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Copper	2.50	300.00	88.00	63.00	66.00	100.00	98.00	260.00
Iron	11.00	340.00	330.00	560.00	4600.00	400.00	250.00	210.00
Lead	0.50	58.00	70.00	73.00	1100.00	110.00	38.00	14.00
Magnesium	500.00	2300.00	2000.00	1300.00	14000.00	1000.00	1000.00	1000.00
Manganese	1.50	28.00	26.00	53.00	570.00	25.00	14.00	10.00
Mercury	#####	#####	#####	#####	#####	#####	#####	#####
Molybdenum	#####	#####	#####	#####	#####	#####	#####	#####
Nickel	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Potassium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Selenium	0.50	2.40	1.90	2.80	1.00	2.50	2.30	1.60
Silicon	#####	#####	#####	#####	#####	#####	#####	#####
Silver	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Sodium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Thallium	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Vanadium	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Zinc	2.00	56.00	50.00	53.00	480.00	56.00	27.00	29.00
CU.M./FILTE	*	1081.84	1019.37	357.03	1010.24	1096.41	1047.58	1003.32

Ref. # 33 p. 11 of 15

/015 BIG RIVER MINE TAILINGS, PANB FMD061GHB

TABLE 2: CONCENTRATION IN AIR (UG/CU.M)

DAY # 4 7/26/90	(BLANK) BR-AM-08 CSXCR432	BR-AM-01 CSXCR425	BR-AM-02 CSXCR426	BR-AM-03 CSXCR427	BR-AM-04 CSXCR428	BR-AM-05 CSXCR429	BR-AM-06 CSXCR430	BR-AM-07 CSXCR431
Aluminum	*	0.114	0.131	0.160	0.597	0.139	0.146	0.103
Antimony	*	0.006	0.006	0.006	0.006	0.005	0.006	0.006
Arsenic	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Barium	*	0.018	0.020	0.021	0.020	0.018	0.019	0.020
Beryllium	* -	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Boron	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cadmium	* -	0.001	0.001	0.001	0.009	0.000	0.001	0.000
Calcium	* -	0.924	0.883	2.090	27.221	0.546	0.477	0.498
Chromium	*	0.001	0.001	0.001	0.002	0.001	0.001	0.001
Cobalt	*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Copper	*	0.275	0.084	0.063	0.063	0.089	0.091	0.256
Iron	*	0.304	0.313	0.574	4.740	0.354	0.223	0.138
Lead	*	0.053	0.068	0.082	1.068	0.100	0.036	0.013
Magnesium	*	1.664	1.471	0.836	13.353	0.455	0.477	0.498
Manganese	*	0.024	0.024	0.054	0.563	0.021	0.012	0.008
Mercury	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Molybdenum	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nickel	*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Potassium	*	0.462	0.450	0.522	0.495	0.455	0.477	0.498
Selenium	*	0.002	0.001	0.002	0.000	0.002	0.002	0.001
Silicon	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Silver	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Sodium	*	0.462	0.450	0.522	0.495	0.455	0.477	0.498
Thallium	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Vanadium	*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Zinc	* -	0.050	0.047	0.053	0.473	0.043	0.024	0.027

P0IE BIG RIVER MINE TAILINGS, PARK F*0061[illegible]

TABLE 1: ORIGINAL DATA (UG/FILTER)

DAY # 5	(BLANK)							
7/27/90	BR-AM-08	BR-AM-01	BR-AM-02	BR-AM-03	BR-AM-04	BR-AM-05	BR-AM-06	BR-AM-07
	CSXCR440	CSXCR433	CSXCR434	CSXCR435	CSXCR436	CSXCR437	CSXCR438	CSXCR439
Aluminum	20.00	760.00	840.00	1000.00	330.00	680.00	720.00	740.00
Antimony	6.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Arsenic	1.00	2.00	2.00	2.70	2.00	2.00	2.00	2.00
Barium	20.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Beryllium	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron	#####	#####	#####	#####	#####	#####	#####	#####
Cadmium	0.50	1.30	1.00	4.70	5.00	1.00	1.00	1.00
Calcium	500.00	3700.00	3800.00	18000.00	13000.00	2500.00	1200.00	1000.00
Chromium	1.00	3.20	2.80	2.70	2.10	2.40	2.00	2.00
Cobalt	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Copper	2.50	170.00	140.00	130.00	40.00	110.00	88.00	240.00
Iron	10.00	320.00	350.00	3.90	2600.00	350.00	820.00	760.00
Lead	0.76	28.00	24.00	290.00	440.00	56.00	24.00	17.00
Magnesium	500.00	3100.00	3200.00	8300.00	6600.00	1100.00	440.00	1000.00
Manganese	1.50	36.00	36.00	400.00	260.00	33.00	23.00	19.00
Mercury	#####	#####	#####	#####	#####	#####	#####	#####
Molybdenum	#####	#####	#####	#####	#####	#####	#####	#####
Nickel	5.00	10.00	10.00	3.30	10.00	10.00	10.00	10.00
Potassium	500.00	1000.00	1000.00	540.00	1000.00	1000.00	1000.00	1000.00
Selenium	0.50	1.90	3.00	3.40	1.70	1.80	1.90	1.10
Silicon	#####	#####	#####	#####	#####	#####	#####	#####
Silver	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Sodium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Thallium	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Vanadium	5.00	36.00	37.00	38.00	10.00	10.00	10.00	10.00
Zinc	2.50	42.00	38.00	170.00	240.00	530.00	27.00	31.00
CU.M./FILTE	*	1006.63	982.60	983.16	1024.47	1095.45	1041.63	1045.83

/015 BIG RIVER MINE TAILINGS, PANO FMD0616HB

TABLE 2: CONCENTRATION IN AIR (UG/CU.M)

DAY # 5	(BLANK)							
7/27/90	BR-AM-08	BR-AM-01	BR-AM-02	BR-AM-03	BR-AM-04	BR-AM-05	BR-AM-06	BR-AM-07
	CSICR440	CSICR433	CSICR434	CSICR435	CSICR436	CSICR437	CSICR438	CSICR439
Aluminum	*	0.735	0.835	0.937	0.868	0.602	0.672	0.668
Antimony	*	0.006	0.006	0.006	0.006	0.005	0.006	0.006
Arsenic	* -	0.001	0.001	0.002	0.001	0.001	0.001	0.001
Barium	* -	0.020	0.020	0.020	0.020	0.018	0.019	0.013
Beryllium	* -	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Boron	* -	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cadmium	* —	0.001	0.001	0.004	0.004	0.000	0.000	0.000
Calcium	* -	3.179	3.358	17.800	12.201	1.826	0.672	0.478
Chromium	* -	0.002	0.002	0.002	0.001	0.001	0.001	0.001
Cobalt	*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Copper	* -	0.166	0.140	0.130	0.037	0.098	0.082	0.227
Iron	*	0.904	0.957	-0.006	2.528	0.858	0.778	0.717
Lead	*	0.027	0.024	0.294	0.429	0.050	0.022	0.016
Magnesium	*	2.583	2.748	8.544	5.354	0.548	-0.058	0.478
Manganese	*	0.034	0.035	0.405	0.252	0.034	0.021	0.017
Mercury	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Molybdenum	* -	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nickel	*	0.005	0.005	0.004	0.005	0.005	0.005	0.005
Potassium	*	0.497	0.509	0.041	0.488	0.456	0.480	0.478
Selenium	*	0.001	0.003	0.003	0.001	0.001	0.001	0.001
Silicon	* -	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Silver	* -	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Sodium	* -	0.497	0.509	0.509	0.488	0.456	0.480	0.478
Thallium	* -	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Vanadium	* -	0.031	0.033	0.034	0.005	0.005	0.005	0.005
Zinc	* -	0.040	0.037	0.171	0.232	0.482	0.024	0.028

Ref. #33 p. 14 of 15

/015 BIG RIVER MINE TAILINGS. PAMA FMD0616HB
TABLE 1: ORIGINAL DATA (UG/FILTER)

DAY # 6 (BLANK)

7/28/90	BR-AM-08 CSXCR449	BR-AM-01 CSXCR441	BR-AM-02 CSXCR442	BR-AM-03 CSXCR443	BR-AM-04 CSXCR444	BR-AM-05 CSXCR445	BR-AM-06 CSXCR446	BR-AM-07 CSXCR448
Aluminum	20.00	670.00	760.00	720.00	780.00	300.00	780.00	820.00
Antimony	6.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Arsenic	1.00	2.00	2.00	2.00	2.10	2.00	2.00	2.40
Barium	20.00	40.00	40.00	40.00	40.00	40.00	11.00	40.00
Beryllium	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron	#####	#####	#####	#####	#####	#####	#####	#####
Cadmium	0.50	1.00	1.00	1.00	1.00	1.00	1.00	7.30
Calcium	500.00	1500.00	1500.00	2200.00	3500.00	2300.00	1500.00	1500.00
Chromium	1.00	2.00	2.50	2.00	3.10	2.20	2.10	2.30
Cobalt	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Copper	2.50	250.00	56.00	81.00	43.00	86.00	64.00	140.00
Iron	40.00	830.00	890.00	380.00	1200.00	1200.00	890.00	350.00
Lead	1.40	29.00	15.00	24.00	170.00	59.00	34.00	76.00
Magnesium	500.00	1000.00	1000.00	1000.00	1500.00	1000.00	1000.00	1000.00
Manganese	1.50	30.00	30.00	49.00	67.00	49.00	32.00	32.00
Mercury	#####	#####	#####	#####	#####	#####	#####	#####
Molybdenum	#####	#####	#####	#####	#####	#####	#####	#####
Nickel	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Potassium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Selenium	0.50	1.70	2.20	2.20	2.00	1.90	1.50	1.80
Silicon	#####	#####	#####	#####	#####	#####	#####	#####
Silver	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Sodium	500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Thallium	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Vanadium	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Zinc	2.00	30.00	23.00	27.00	50.00	64.00	25.00	62.00
CU.M./FILTE	*	898.78	876.46	377.68	866.36	369.61	919.21	866.05

7015 BIG RIVER MINE TAILINGS. PAN# FMO0616HB

TABLE 2: CONCENTRATION IN AIR (UG/CU.M)

DAY # 6 7/28/90	(BLANK) BR-AM-08 CSXCR449	BR-AM-01 CSXCR441	BR-AM-02 CSXCR442	BR-AM-03 CSXCR443	BR-AM-04 CSXCR444	BR-AM-05 CSXCR445	BR-AM-06 CSXCR446	BR-AM-07 CSXCR448
Aluminum	*	0.723	0.844	0.716	0.857	0.908	0.805	0.924
Antimony	*	0.007	0.007	0.006	0.007	0.006	0.007	0.007
Arsenic	*	0.001	0.001	0.001	0.001	0.001	0.001	0.002
Barium	*	0.022	0.023	0.020	0.023	0.021	-0.010	0.023
Beryllium	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Boron	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cadmium	*	0.001	0.001	0.001	0.001	0.001	0.001	0.008
Calcium	*	1.113	1.141	1.738	3.385	1.856	1.088	1.155
Chromium	*	0.001	0.002	0.001	0.002	0.001	0.001	0.002
Cobalt	*	0.006	0.006	0.005	0.006	0.005	0.005	0.006
Copper	*	0.275	0.061	0.080	0.046	0.066	0.067	0.159
Iron	*	0.879	0.970	0.961	1.309	1.156	0.925	1.051
Lead	*	0.031	0.016	0.023	0.190	0.059	0.035	0.086
Magnesium	*	0.526	0.570	0.511	1.128	0.516	0.544	0.577
Manganese	*	0.032	0.033	0.049	0.074	0.049	0.033	0.035
Mercury	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Molybdenum	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nickel	*	0.006	0.006	0.005	0.006	0.005	0.005	0.006
Potassium	*	0.526	0.570	0.511	0.564	0.516	0.544	0.577
Selenium	*	0.001	0.002	0.002	0.002	0.001	0.001	0.002
Silicon	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Silver	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Sodium	*	0.526	0.570	0.511	0.564	0.516	0.544	0.577
Thallium	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Vanadium	*	0.006	0.006	0.005	0.006	0.005	0.005	0.006
Zinc	*	0.031	0.024	0.026	0.054	0.064	0.025	0.069

EXPLANATION OF THE DATA UTILIZED TO GENERATE THE WIND ROSES

Wind direction and wind speed data recorded by the portable meteorological station were used to generate a wind rose for each day of air sampling. The data from 12:00 noon to 12:00 midnight was used because that was the time interval in which the air samples were collected.

Wind direction was divided into the following sixteen categories (based on compass degrees):

.0 to 22.49
22.50 to 44.99
45.00 to 67.49
67.50 to 89.99
90.00 to 112.49
112.50 to 134.99
135.00 to 157.49
157.50 to 179.99
180.00 to 202.49
202.50 to 224.99
225.00 to 247.49
247.50 to 269.99
270.00 to 292.49
292.50 to 314.99
315.00 to 337.49
337.50 to 360.00

Wind speed was divided into the following classes:

Class 1 = 0 to 1.8 meters/second
Class 2 = 1.8 to 3.3 meters/second
Class 3 = 3.3 to 5.4 meters/second

No wind speeds over 5.4 meters/second were recorded during the Big River air sampling event.

The wind direction and wind speed was recorded every fifteen minutes, for a total of 49 wind direction and wind speed recordings (between 12:00 noon and 12:00 midnight) each day. The summary table of wind rose data (Reference # 40) consists of sixteen wind directions with three possible corresponding wind speed classes. There is a total of 48 different wind direction/wind speed categories. A tally was kept from the portable meteorological station data (Reference # 39) of the number of times the wind direction and corresponding wind speed fell into each of the 48 categories. Each day's tally was entered into the WROSE program and wind roses were generated.

On site Meteorological Station Data

Big River Mine Tailings Site
Desloge, Missouri
July 23-28, 1990

Ref. #23 p.3 of


```
  Recovery Call Interval #2 (minutes):
Maximum Time Call Will Take (minutes):
                     Next Time To Call:
      Interface Devices:
     COM1                 Baud Rate: 9600
     End
```

SPLIT parameter file:

15MIN.PAR

```
     Name(s) of input DATA FILE(s): PSD.DAT
   Name of OUTPUT FILE to generate: 15MIN.PRN/R
         START reading in PSD.DAT:
          STOP reading in PSD.DAT:
                Copy from PSD.DAT: 1[1]
    SELECT element #(s) in PSD.DAT: DATE (2;1989.0), 3..11
               HEADING for report: 15 MINUTE METEOROLOGICAL DATA
      HEADINGS for PSD.DAT  col #1: DATE
                        column #2: HR/MIN
                        column #3: WIND\M/S
                        column #4: WIND\DEG
                        column #5: STD DEV\DIREC
                        column #6: TEMP\DEG C
                        column #7: RH\%
                        column #8: BARO\PRESS
                        column #9: BATTERY\VOLTS
                       column #10: PRECIP\.01"
```

	Date	Hr/Min	Wind m/S	Wind Deg	STD DEV DIREC	TEMP Deg C	RH%	BARO PRESS
	204	815	.68	274.6	16.27	20.78	82	12.03
	204	830	.541	307.1	43.59	21.17	78.4	12.03
	204	845	.954	1.946	25.97	21.66	71.5	12.02
	204	900	1.05	349.8	20.7	21.95	69.08	12.03
	204	915	1.033	355.4	27.06	22.44	66.38	12.04
	204	930	1.129	35.47	34.78	22.73	65.24	12.02
	204	945	1.607	20.81	15.68	22.96	62.15	12.04
	204	1000	1.155	27.83	23.63	23.57	59.88	12.05
	204	1015	1.451	24.83	29.71	23.63	57.65	12.04
	204	1030	1.544	13.39	37.67	24	55.38	12.05
	204	1045	1.28	345.9	31.65	23.98	54.06	12.05
	204	1100	1.048	7.15	56.64	24.62	53.6	12.04
	204	1115	.969	31.37	50.17	24.71	51.58	12.04
	204	1130	2.017	6.877	23.59	24.32	52.42	12.04
Day 1	204	1145	1.936	3.059	29.41	24.64	48.6	12.04
Start	204	1200	2.107	18.85	26.89	24.99	48.88	12.04
	204	1215	1.994	13.24	24.9	24.89	47.52	12.04
	204	1230	2.064	31.99	30.08	25.41	46.2	12.04
	204	1245	1.882	43.83	50.05	25.49	45.23	12.04
	204	1300	2.054	359.7	30.12	25.57	46.11	12.04
	204	1315	2.064	13.42	24.63	25.69	45.45	12.04
	204	1330	1.96	357.8	28.76	26.03	43.68	12.04
	204	1345	1.896	8.23	36.77	26.14	42.98	12.04
	204	1400	1.98	11.06	31.11	26.07	43.5	12.04
	204	1415	2.413	338.9	27.11	26.26	43.19	12.04
	204	1430	1.856	331.9	33.08	26.28	43.09	12.04
	204	1445	2.212	54.96	24.11	25.95	45.33	12.04
	204	1500	2.15	326.7	23.57	26.41	42.72	12.03
	204	1515	2.086	324.5	25.56	26.7	41.9	12.04
	204	1530	2.381	337.6	20.51	26.65	41.3	12.04
	204	1545	1.992	329.7	21.54	26.7	40.64	12.04
	204	1600	2.008	335.3	31.23	26.84	40.69	12.04
	204	1615	2.551	5.86	24.84	26.72	40.27	12.03
	204	1630	1.974	4.514	28.33	26.83	40.01	12.03
	204	1645	1.773	317.3	31.42	27.1	39.48	12.03
	204	1700	1.74	331.9	24.14	27.22	38.88	12.03
	204	1715	1.923	338	21.32	26.82	39.45	12.03
	204	1730	1.806	342	15.12	26.15	40.3	12.03
	204	1745	1.809	43.05	32.91	26.36	43.19	12.03
	204	1800	2.389	35.98	16.42	26.32	44.08	12.02
	204	1815	2.025	54.61	25.9	26.1	45.29	12.02
	204	1830	1.56	45.52	20	26.15	45.59	12.02
	204	1845	1.892	31.37	18.29	26.16	45.06	12.02
	204	1900	1.991	30.94	13.15	26.06	45.5	12.02
	204	1915	1.909	28.63	13.82	25.71	47.17	12.02
	204	1930	1.62	40.53	9.8	25.27	48.4	12.02
	204	1945	1.113	41.38	7.18	24.94	49.84	12
	204	2000	.813	31.74	9.72	24.29	55.62	12.01
	204	2015	.094	300.9	12.79	22.87	73.6	12
	204	2030	0	329.7	0	21.64	83.7	12
	204	2045	.03	262.3	11.28	20.73	90.9	11.98
	204	2100	.806	256.6	3.875	19.97	94.4	11.98
	204	2115	.685	243.7	7.6	19.56	96.5	11.97
	204	2130	1.022	243.5	9.08	19.15	97.2	11.98
	204	2145	.505	249.6	5.648	18.78	98.7	11.96
	204	2200	.235	252.3	1.237	18.34	101	11.96
	204	2215	.731	256.7	6.931	17.92	102.3	11.95
	204	2230	.508	255.2	8.88	17.59	102.9	11.95
	204	2245	.61	251.5	14.66	17.33	103.3	11.94
	204	2300	.486	234.1	7.25	17.2	103.4	11.35
	204	2315	.546	230.2	6.328	17.19	103.4	11.94

	204	2345	1.535	246	9.2	16.94	103.8	11.93
Stop	205	0	.924	246.3	7.56	16.88	104	11.93
	205	0	.527	.665	.281	.096	.027	0
	205	15	.363	228.6	8.59	16.61	104.1	11.93
	205	30	.912	209	55.97	16.51	104.3	11.93
	205	45	.517	256.6	25.67	16.09	104.4	11.93
	205	100	.717	231.7	14.62	16.05	104.7	11.93
	205	115	.933	237.9	12.79	15.84	104.8	11.93
	205	130	1.288	250.1	8.19	15.67	105	11.93
	205	145	1.325	244.4	8.01	15.76	105	11.92
	205	200	1.144	243.1	10.89	15.82	105	11.92
	205	215	1.076	241.2	10.42	15.67	105.1	11.91
	205	230	1.093	242	9.23	15.56	105.2	11.92
	205	245	.825	236.8	11.04	15.36	105.3	11.92
	205	300	.81	238.7	10.61	15.3	105.3	11.91
	205	315	.635	234.5	9.35	15.06	105.3	11.91
	205	330	.958	243	8.44	14.9	105.4	11.91
	205	345	.417	237	8.98	14.68	105.5	11.91
	205	400	.195	189.3	20.09	14.58	105.5	11.91
	205	415	.62	247.9	5.487	14.43	105.6	11.91
	205	430	.901	236.5	10.37	14.01	105.7	11.91
	205	445	.722	241.8	10.28	14.08	105.8	11.91
	205	500	1.006	236.7	9.03	14.14	105.8	11.91
	205	515	1.077	234.8	7.28	14.2	105.8	11.91
	205	530	.889	239.1	10.05	14.1	105.8	11.91
	205	545	.745	238.9	6.934	13.98	105.8	11.91
	205	600	1.118	236.5	8.36	13.91	105.8	11.91
	205	615	.743	239	11.99	14.03	105.8	11.91
	205	630	.741	235.8	11.73	14.2	105.6	11.91
	205	645	.931	230.7	13.2	14.46	105.3	11.91
	205	700	.502	231.3	10.83	14.84	104.8	11.91
	205	715	.581	243.8	12.41	15.06	104.1	11.91
	205	730	.582	238.3	12.63	15.58	103.3	11.91
	205	745	.654	201	18.29	16.24	101.4	11.91
	205	800	.14	230.6	35.84	16.97	98	11.91
	205	815	.509	291.7	17.23	17.51	94.9	11.93
	205	830	.238	268	12.48	18.25	92.6	11.93
	205	845	.058	20.55	14.28	19.15	88.4	11.93
	205	900	.564	19.8	20.99	19.44	86.1	11.93
	205	915	.318	90	35.77	20.88	79.9	11.94
	205	930	.096	299.5	55.5	21.96	75.5	11.95
	205	945	.083	97.6	75.4	23.95	68.14	11.95
	205	1000	.345	133.3	51.06	24.78	61.55	11.96
	205	1015	.981	206.5	32.75	24.99	53.17	11.96
	205	1030	1.15	209.8	39.08	25.28	49.97	11.97
	205	1045	.92	163.5	39.69	25.86	46.65	11.98
	205	1100	1.196	181.5	39.18	26.01	46.04	11.98
	205	1115	1.697	169.6	30.32	26.15	45.2	11.99
	205	1130	1.169	176	69.01	26.32	43.37	11.99
Day 2	205	1145	1.51	86.5	32.89	26.62	43.16	11.99
start	205	1200	1.415	54.57	43.72	26.95	43.26	11.99
	205	1215	1.977	199.4	22.7	26.6	45.13	11.99
	205	1230	1.892	207.7	16.42	26.37	46.18	12
	205	1245	1.424	177.4	20.98	26.5	46.42	12
	205	1300	.966	176.2	51.24	27.04	44.15	12
	205	1315	1.651	133.3	45.56	26.73	45.66	12
	205	1330	1.967	134.3	32.41	26.91	43.16	12
	205	1345	1.595	167.9	48.59	27.38	42.67	12
	205	1400	1.422	179.9	35.58	27.79	40.64	12
	205	1415	1.449	142.4	27.03	27.77	40.05	12
	205	1430	2.246	169.4	22.9	27.37	41.78	11.99
	205	1445	2.332	156.9	33.85	27.6	40.76	12
	205	1500	3.127	167.7	22.12	27.99	41.05	12
	205	1515	2.508	185	11.75	27.86	40.31	12
	205	1530	2.667	168.6	29.55	27.64	40.71	12

205	1600	2.064	180.2	25.17	27.87	39.86	12
205	1615	2.877	178.3	15.02	27.65	40.32	11.99
205	1630	2.083	161.9	18.33	28.22	38.48	11.99
205	1645	2.185	187.2	20.4	28.17	38.78	11.98
205	1700	2.362	168.2	18.2	28.05	39.63	11.98
205	1715	2.671	173.3	16.31	28.03	39.08	11.98
205	1730	1.906	208.4	19.66	27.55	41.51	11.98
205	1745	1.511	229.2	16.58	27.46	42.43	11.98
205	1800	2.271	192.3	23.27	27.78	40.52	11.98
205	1815	2.893	173.5	8.7	27.85	40.05	11.98
205	1830	2.25	176.3	10.4	27.73	40.25	11.98
205	1845	2.415	178.9	9.66	27.52	41.8	11.97
205	1900	2.325	174.1	8.05	27.3	42.99	11.98
205	1915	2.11	168.7	9.68	27.04	44.04	11.98
205	1930	1.555	168.8	7.29	26.76	46.34	11.97
205	1945	1.396	116.1	26.32	25.91	50	11.97
205	2000	1.983	113.4	12.8	25.27	52.09	11.97
205	2015	2.178	118.1	12.14	25.03	52.66	11.96
205	2030	2.09	122	10.03	24.66	54.36	11.96
205	2045	1.527	123.4	9.92	24.01	57.51	11.94
205	2100	2.515	131	9.44	24.04	57.71	11.95
205	2115	1.842	121.7	11.77	23.23	61.26	11.94
205	2130	.859	112.2	14.06	22.11	69.32	11.94
205	2145	.411	72.1	47.18	21.49	74.8	11.94
205	2200	.333	15.8	10.73	20.54	83.6	11.92
205	2215	.294	38.62	30.58	20.1	88.3	11.92
205	2230	.175	14.16	1.132	19.36	94.1	11.92
205	2245	.67	22.18	21.08	19.07	96.8	11.91
205	2300	.491	26.04	25.58	18.93	99.6	11.92
205	2315	.153	357.8	41.33	18.66	99.5	11.9
205	2330	.608	275.1	11.61	17.93	100.8	11.9
205	2345	.281	.814	50.95	17.75	101.9	11.9
stop 206	0	.32	26.61	60.54	17.7	102.3	11.89
206	0	.012	.026	.012	.025	.109	.3
206	15	.047	289.3	6.061	17.43	102.5	11.89
206	30	.347	42.12	34.7	17.41	103	11.9
206	45	.365	26.94	31.31	17.31	103.3	11.89
206	100	.45	26.42	34.09	17.19	103.5	11.88
206	115	.132	331.5	23.74	17.01	103.5	11.88
206	130	.177	271.5	2.896	16.74	103.7	11.88
206	145	.638	65.15	15.88	16.61	103.9	11.89
206	200	.631	74.1	4.241	16.57	104.1	11.89
206	215	.573	73.8	5.824	16.47	104.1	11.88
206	230	.541	61.91	4.121	16.49	104.1	11.88
206	245	.636	55.58	11.4	16.38	104.2	11.88
206	300	1.08	266.3	11.5	16.15	104.4	11.88
206	315	1.229	258	5.629	15.88	104.3	11.87
206	330	.991	243.6	5.99	15.91	104	11.87
206	345	.611	223.7	5.752	16.01	104.1	11.87
206	400	.681	222.7	16.36	15.99	104.2	11.87
206	415	.079	209.7	2.578	15.97	104.4	11.87
206	430	.004	208.3	.492	15.95	104.5	11.87
206	445	.027	208.7	.474	15.68	104.7	11.87
206	500	.095	116.5	53.87	15.45	104.7	11.87
206	515	.019	233	61.79	15.41	104.8	11.87
206	530	.583	264.8	6.552	15.05	105	11.87
206	545	.08	104.5	43.59	14.93	105	11.87
206	600	0	93.5	0	15.09	105	11.87
206	615	.159	67.63	4.736	15.2	105.1	11.87
206	630	0	311.4	29.68	15.05	105.1	11.87
206	645	.301	254.5	18.79	15.07	104.9	11.87
206	700	.79	237.1	8.35	15.58	104.5	11.87
206	715	.2	251.9	8.54	16.4	103.2	11.87
206	730	.293	49.98	21.49	[illegible]	[illegible]	[illegible]

Ref. #23
p. 7 of 26

	206	815	.513	44.13	32.44	20.99	81	11.89
	206	830	.495	95.3	32.06	22.38	72.1	11.89
	206	845	2.378	155.6	14.77	23.22	62.44	11.89
	206	900	3.102	141.7	12.02	23.74	56.63	11.9
	206	915	2.96	145.2	13.97	24.41	53.58	11.91
	206	930	3.774	144.5	13.37	24.85	49.84	11.91
	206	945	4.371	147.5	9.89	25.07	47.1	11.92
	206	1000	4.113	165	10.2	25.45	45.95	11.92
	206	1015	4.308	153.3	12.96	25.8	45.39	11.92
	206	1030	4.084	165.3	13.36	26.04	45.25	11.92
	206	1045	4.49	165.6	16.88	26.37	43.98	11.92
	206	1100	4.41	167	10.27	26.62	42	11.93
	206	1115	3.897	156.8	14.79	26.88	39.85	11.93
	206	1130	3.543	151.8	19.15	27.17	40.27	11.94
Day 3	206	1145	3.486	166.7	18.68	26.99	39.81	11.93
start	206	1200	3.757	150.4	14.45	27.44	38.24	11.94
	206	1215	3.313	166	14.52	27.46	39.14	11.94
	206	1230	2.968	162.5	26.82	27.5	39.31	11.94
	206	1245	3.108	181.8	24.44	27.74	38.56	11.94
	206	1300	3.106	171.8	19.5	27.99	37.85	11.94
	206	1315	3.226	139.3	18.68	27.94	37.72	11.94
	206	1330	3.742	146	9.97	27.92	38.59	11.94
	206	1345	2.9	141	25.62	28.28	37.95	11.95
	206	1400	3.34	177.5	20.58	28.41	37.62	11.94
	206	1415	2.435	144.9	19.59	28.41	38.07	11.94
	206	1430	3.828	145.3	17.43	28.54	39.12	11.94
	206	1445	2.899	166.4	24.07	28.67	38.17	11.94
	206	1500	3.134	154.4	30.87	28.98	37.26	11.94
	206	1515	3.652	160.8	21.78	29.13	34.59	11.94
	206	1530	3.494	189	20.02	29.05	34.03	11.94
	206	1545	2.944	158.1	25.09	29.16	33.88	11.94
	206	1600	3.623	161.7	18.63	29.22	33.18	11.94
	206	1615	3.823	170.9	14.77	29.19	34.33	11.94
	206	1630	3.436	187.9	17.39	29.05	34.47	11.94
	206	1645	2.863	159.4	22.31	28.98	34.78	11.94
	206	1700	3.249	156.7	17.51	29.01	37.21	11.94
	206	1715	3.433	166.1	17.5	29.07	36.67	11.94
	206	1730	3.546	175.3	12.44	29.09	36.68	11.94
	206	1745	3.624	167.3	17.66	28.89	38.83	11.94
	206	1800	3.886	138.9	14.79	28.73	38.98	11.94
	206	1815	3.712	140.2	14.7	28.47	39.26	11.94
	206	1830	3.405	155.8	11.76	28.39	39.28	11.94
	206	1845	3.124	165.4	10.96	28.16	42.31	11.92
	206	1900	3.222	171	9.66	27.77	43.52	11.93
	206	1915	2.943	171.4	8.6	27.54	44.77	11.92
	206	1930	2.899	164.3	6.851	27.15	46.45	11.92
	206	1945	2.423	150.2	14.1	26.64	48.32	11.92
	206	2000	2.008	125.5	12.78	26.32	49.59	11.92
	206	2015	1.215	131.3	8.45	25.54	54.19	11.92
	206	2030	1.169	98.6	11.7	24.79	58.67	11.91
	206	2045	1.389	99.7	7.4	24.01	63.45	11.9
	206	2100	1.273	99.2	12.2	23.79	65.11	11.9
	206	2115	1.462	119.2	24.14	23.38	67.45	11.9
	206	2130	2.046	131.9	9.12	23.78	66.24	11.88
	206	2145	1.336	136.1	22.9	23.12	69.23	11.89
	206	2200	.275	295.4	26.86	21.47	81.4	11.88
	206	2215	.273	349	6.973	20.46	90	11.88
	206	2230	.193	80.5	3.892	19.96	96.5	11.87
	206	2245	.048	88.1	20.67	19.84	98.8	11.87
	206	2300	.667	272.5	4.754	19.27	99.8	11.86
	206	2315	.214	277.6	.846	18.91	100.6	11.86
	206	2330	.026	277.2	0	18.83	100.9	11.86
	206	2345	.277	277.4	0	18.88	101.9	11.85
stop	207	0	0	277.3	0	18.65	102.5	11.86
	207	0	.001	.007	.018	.035	.089	2.099
	207	15	.126	277	0	[illegible]	[illegible]	[illegible]

Ref. #23
p. 8 of 26

	207	30	.288	277.2	0	18.08	102.8	11.85
	207	45	.569	81.2	22.44	18.1	103.1	11.85
	207	100	.014	53.05	2.429	18.04	103.4	11.85
	207	115	.204	.953	26.43	17.85	103.5	11.84
	207	130	.25	294.2	23.96	17.58	103.3	11.84
	207	145	.539	63.23	56.05	17.6	103.4	11.84
	207	200	.152	302.7	10.02	17.24	103.4	11.84
	207	215	.326	5.94	42.68	17.05	103.3	11.84
	207	230	.692	346	50.82	17.25	103.5	11.84
	207	245	.565	51.46	49.15	17.32	103.5	11.84
	207	300	.703	271.8	15.04	16.89	103.7	11.84
	207	315	.23	61.97	20.4	17.05	103.6	11.84
	207	330	1.041	292.7	8.73	16.74	103.2	11.84
	207	345	.649	263.5	44.97	16.71	103.4	11.83
	207	400	.826	280.5	11.57	16.72	103.3	11.85
	207	415	1.152	265.6	5.744	16.97	100.8	11.84
	207	430	.076	300	54.19	17.16	99.9	11.84
	207	445	.43	55.97	62.72	16.91	101.3	11.84
	207	500	1.153	82.7	6.962	16.48	103.2	11.84
	207	515	.437	43.98	16.98	16.7	103.5	11.83
	207	530	.365	353.5	26.47	16.76	102.9	11.84
	207	545	.974	63.71	6.408	16.91	102.5	11.83
	207	600	.692	39.47	20.88	16.88	102.4	11.84
	207	615	1.006	63.32	10.81	16.36	103.2	11.83
	207	630	.657	61.79	4.133	16.81	103.1	11.84
	207	645	.32	48.64	12.62	17.47	101	11.83
	207	700	.476	8.88	13.64	18.44	96.1	11.84
	207	715	.147	69.75	39.79	19.26	93.3	11.84
	207	730	1.03	76.5	9.86	18.93	94	11.84
	207	745	.871	68.73	14.16	19.65	90.7	11.84
	207	800	.58	25.96	14.92	21.02	81.9	11.84
	207	815	.901	137	51.08	22.33	73.8	11.85
	207	830	2.164	158.2	27.77	23.2	67.99	11.86
	207	845	2.72	166	21.98	23.81	64.09	11.86
	207	900	3.224	146.5	10.96	24.23	62.04	11.87
	207	915	3.203	152.2	8.14	24.3	62.08	11.87
	207	930	3.043	156.5	9.82	24.83	61.01	11.87
	207	945	3.206	171.8	13.26	25.32	59.67	11.87
	207	1000	2.859	184.1	17.55	25.62	58.51	11.87
	207	1015	2.705	175.7	10.33	25.92	56.83	11.88
	207	1030	3.426	178.3	12.23	26.19	54.83	11.88
	207	1045	3.576	178.1	10.5	26.39	54.02	11.88
	207	1100	4.011	179.8	9.1	26.57	52.17	11.88
	207	1115	3.409	177.5	12.3	26.83	51.82	11.88
	207	1130	3.718	171.7	13.89	27.18	50.76	11.89
Day 4	207	1145	2.981	181.9	20.86	27.36	49.91	11.88
start	207	1200	3.61	197.1	16.37	27.65	48.39	11.88
	207	1215	3.331	182.9	16.95	27.67	48.31	11.88
	207	1230	3.34	176.1	18.25	27.61	48.4	11.89
	207	1245	2.731	180.6	20.52	27.69	48.52	11.88
	207	1300	3.148	177.5	13.72	27.72	46.65	11.89
	207	1315	3.011	176.8	12.01	27.56	47.04	11.89
	207	1330	3.081	178	12.52	27.73	48.03	11.89
	207	1345	2.971	197.2	12.64	27.69	47.39	11.89
	207	1400	2.417	183.5	17.62	27.83	47.63	11.89
	207	1415	3.252	159.4	17.03	28.05	46.18	11.88
	207	1430	3.39	171.2	10.9	27.71	47.31	11.89
	207	1445	2.735	157.8	11.77	27.82	47.81	11.88
	207	1500	1.911	160.2	22.76	28.38	46.79	11.89
	207	1515	2.258	175.2	18.36	28.07	48.26	11.88
	207	1530	2.1	180.3	13.09	27.99	48.94	11.88
	207	1545	1.775	187.7	13.68	28.1	49.47	11.89
	207	1600	1.84	188.7	11.64	28.04	50.72	11.88
	207	1615	2.337	201.5	27.83	27.91	51.62	11.88
	207	1630	1.595	241.6	17.22	27.46	55.46	11.88
	207	1645	1.801	249.7	12.62	26.99	50.38	11.87

Ref. #23
p. 9 of 26

207	1715	1.287	243.5	12.7	26.9	61.95	11.87
207	1730	1.171	235.5	16.68	27.04	62.6	11.87
207	1745	1.109	221.9	13.8	27.22	62.34	11.88
207	1800	1.219	230.2	16.81	27.21	62.7	11.88
207	1815	1.133	230.3	16.64	26.96	63.65	11.87
207	1830	1.076	246.4	11.62	26.67	66.09	11.87
207	1845	1.261	219.2	18.94	26.4	67.67	11.87
207	1900	1.836	184.4	13.35	26.39	67.01	11.87
207	1915	2.065	168.3	10.14	26.24	65.36	11.86
207	1930	1.122	203.6	19.64	26.11	64.91	11.86
207	1945	.457	262.7	9.26	25.56	68.15	11.86
207	2000	.161	207.1	18.07	25.32	69.78	11.86
207	2015	0	207.1	.479	24.99	73.3	11.85
207	2030	0	206.9	.46	24.64	75.5	11.85
207	2045	0	206.9	.46	24.13	79.5	11.85
207	2100	.02	207.2	.465	23.42	86.5	11.84
207	2115	0	207.2	.47	23.04	92	11.84
207	2130	0	207	.462	22.78	94.4	11.84
207	2145	.637	74.4	26.49	22.16	98.2	11.84
207	2200	.218	63.33	.225	21.84	100.1	11.84
207	2215	.138	275.1	14.32	21.71	100.9	11.83
207	2230	.202	273.7	.274	21.38	101.1	11.83
207	2245	.144	310.5	47.4	21.24	101.8	11.83
207	2300	.453	22.49	9.01	21.35	101.5	11.82
207	2315	.011	7.14	.093	21.04	101.3	11.82
207	2330	0	7.15	.097	20.79	101.8	11.82
207	2345	0	7.6	.088	20.7	102.3	11.82
stop 208	0	.052	270.8	11.44	20.64	102.6	11.82
208	0	.008	.011	.043	.044	.014	.532
208	15	.63	274.7	1.483	20.29	102.7	11.82
208	30	.255	275.2	0	20.19	103	11.82
208	45	.376	275.3	0	20.01	103.2	11.81
208	100	.346	275.1	.125	19.99	103.3	11.82
208	115	.114	275.5	0	20	103.3	11.81
208	130	.202	43.31	37.33	19.93	103.5	11.82
208	145	0	47.98	.296	19.86	103.6	11.81
208	200	0	48.46	.247	19.78	103.7	11.81
208	215	.205	48.26	.259	19.92	103.8	11.81
208	230	.204	345	31.51	19.99	103.8	11.81
208	245	.453	31.09	15.26	20.16	103.8	11.81
208	300	.028	39.32	36.55	20.44	103.7	11.81
208	315	.29	106.6	12.19	20.23	103.5	11.81
208	330	.026	26.77	13.75	20.32	103.3	11.81
208	345	.176	316	2.689	20.45	103.2	11.8
208	400	0	316.3	0	20.45	103	11.82
208	415	0	316.1	0	20.48	102.9	11.8
208	430	.402	49.04	12.85	20.41	102.7	11.81
208	445	.112	35.91	51.3	20.44	102.9	11.81
208	500	.42	119.3	16.87	20.93	99.8	11.81
208	515	.207	113.1	14.69	21.23	94.9	11.81
208	530	.055	29.58	1.513	21.21	94.9	11.82
208	545	.316	160.8	16.51	21.07	97.3	11.81
208	600	.087	158.1	0	20.98	98.3	11.81
208	615	.138	276.2	57.42	21.02	97.6	11.82
208	630	0	299.9	0	21.01	99.1	11.81
208	645	.079	300	0	20.88	100.3	11.81
208	700	0	300	0	20.9	99.8	11.81
208	715	0	300	0	21.24	98.2	11.81
208	730	0	300	0	21.76	95.8	11.82
208	745	.112	38.11	6.621	21.98	93.2	11.81
208	800	.292	36.7	2.284	22.33	92.5	11.81
208	815	.137	33.13	1.3	23.16	83.7	11.81
208	830	1.144	172.2	12.56	24.26	75.7	11.81
208	845	2.109	173	7.46	24.89	70.2	11.82
208	900	1.958	172.2	11.75	25.49	67.08	11.82

Ref. #23
p. 10 of 26

	208	930	1.992	176.8	8.73	26.21	63.86	11.83
	208	945	1.571	203.2	28.24	27.06	61.63	11.84
	208	1000	2.558	201.9	19.53	27.3	56.84	11.84
	208	1015	2.668	186.3	15.49	27.47	57.19	11.83
	208	1030	2.81	187.4	14.34	27.78	56.29	11.84
	208	1045	2.611	177.7	14.93	28.26	55.96	11.84
	208	1100	2.596	189.5	19.74	28.9	53.79	11.84
	208	1115	2.561	197.4	20.94	29.29	52.02	11.84
	208	1130	2.64	235.9	25.17	29.53	51.41	11.85
Day 5	208	1145	2.276	242.7	19.31	29.53	51.18	11.85
start	208	1200	2.045	201	29.16	29.87	50.88	11.86
	208	1215	1.69	260.9	32.65	30.41	50.08	11.86
	208	1230	2.27	220.1	43.21	30.6	49.16	11.86
	208	1245	1.345	274.9	28.78	31.05	47.62	11.86
	208	1300	.91	181.6	64	31.69	46.53	11.86
	208	1315	1.68	271.1	43.25	31.93	45.87	11.86
	208	1330	1.214	311	73.5	31.81	45.84	11.86
	208	1345	1.127	210.2	54.79	32.49	45.19	11.86
	208	1400	.951	222.7	62.68	32.39	44.4	11.87
	208	1415	1.037	262	73.7	31.88	43.82	11.87
	208	1430	1.147	21.11	42.07	31.57	44.92	11.87
	208	1445	2.071	295.5	21.76	30.47	49.7	11.85
	208	1500	2.752	271.7	16.53	28.14	59.6	11.85
	208	1515	1.276	306.1	21.74	27.22	66.47	11.84
	208	1530	1.34	286.3	19.74	28.12	64.98	11.85
	208	1545	1.264	271.6	23.12	30.15	61.2	11.85
	208	1600	.752	12.75	64.83	32.26	47.17	11.85
	208	1615	1.336	130.2	43.43	32.51	42.45	11.85
	208	1630	1.29	135.7	26.93	32.3	42.12	11.85
	208	1645	1.137	91.8	23.25	32.45	40.64	11.85
	208	1700	.903	88.8	26.49	32.85	38.32	11.86
	208	1715	.752	92.7	37.98	32.97	37.87	11.85
	208	1730	1.236	92.5	22.24	32.53	38.81	11.86
	208	1745	1.031	81.2	15.14	32.38	39.46	11.85
	208	1800	2.649	152.1	35.37	31.2	45.71	11.85
	208	1815	3.597	168	9.93	29.67	55.89	11.84
	208	1830	3.418	154.8	9.48	29.25	58.99	11.84
	208	1845	3.267	155.9	9.28	29.01	58.88	11.84
	208	1900	3.223	146.7	11.68	28.67	61.33	11.83
	208	1915	2.585	154.3	10.27	28.4	62.42	11.83
	208	1930	2.673	149.7	9.45	28.15	64.38	11.83
	208	1945	2.184	149.1	10.05	27.87	66.64	11.82
	208	2000	1.853	137.7	11.58	27.9	67.77	11.82
	208	2015	1.413	134.3	18.39	27.72	68.65	11.82
	208	2030	.453	291.8	6.877	26.22	77.6	11.81
	208	2045	.611	299.6	8.13	25.21	84.6	11.81
	208	2100	.08	331.1	20.44	24.58	90	11.8
	208	2115	.263	42.5	65.45	24.26	93	11.8
	208	2130	.026	82.5	.134	23.99	96.2	11.8
	208	2145	0	82.6	.101	23.71	97.6	11.79
	208	2200	0	82.6	.093	23.21	98.9	11.8
	208	2215	.276	77.5	5.2	22.93	100	11.78
	208	2230	.407	12.97	51.81	22.79	101.3	11.79
	208	2245	.083	262.2	3.098	22.58	101.2	11.78
	208	2300	.081	253.7	.479	22.33	101.6	11.79
	208	2315	.052	253.8	.383	22.05	102	11.78
	208	2330	.012	253.8	.381	21.87	102.3	11.78
	208	2345	.309	253.8	.395	21.67	102.5	11.78
top	209	0	.02	253.8	.381	21.4	102.6	11.78
	209	0	.007	.016	.022	.033	.038	.471
	209	15	.32	253.9	.38	21.17	102.8	11.78
	209	30	.208	252.8	.404	21.17	103	11.78
	209	45	.538	251.4	.976	21.05	103.1	11.77
	209	100	.052	175	3.558	21.04	103.3	11.78
	209	115	.22	95.9	.618	20.89	103.4	11.77

Ref. #23
p. 11 of 26

209	145	.68	259.1	14.01	20.26	103.6	11.77
209	200	.605	237.6	7.87	20.19	103.7	11.77
209	215	.321	213.5	1.77	20.08	103.7	11.76
209	230	.307	243	33.67	20.16	103.9	11.77
209	245	.309	267.5	9.67	19.82	104	11.77
209	300	.285	272.2	3.194	19.62	104	11.77
209	315	.482	260.8	21.09	19.39	104	11.76
209	330	.432	225.9	12.11	19.49	104.1	11.77
209	345	.559	264.5	5.089	19.27	104.2	11.76
209	400	.507	271.2	3.012	19.09	104.3	11.76
209	415	.006	272.5	.902	19.14	104.4	11.77
209	430	.825	243.8	33.4	19.26	104.4	11.76
209	445	.404	255.6	9.9	18.89	104.5	11.76
209	500	0	238.1	.509	18.93	104.5	11.76
209	515	0	238.1	.496	18.91	104.5	11.76
209	530	.317	254.5	13.39	18.89	104.6	11.76
209	545	.338	257.6	2.992	18.53	104.6	11.76
209	600	.52	243.1	13.81	18.45	104.7	11.76
209	615	.009	223.7	.501	18.38	104.7	11.76
209	630	.228	224.1	.529	18.33	104.7	11.76
209	645	.401	260.2	17.15	18.23	104.7	11.76
209	700	.879	246.7	8.92	18.59	104.7	11.76
209	715	.652	247.2	7.14	19.09	104.2	11.76
209	730	.004	237	.499	19.8	103.4	11.76
209	745	.192	237.3	.489	20.61	101.2	11.76
209	800	0	237.2	.483	21.76	96.7	11.77
209	815	.169	126.1	28.21	23.35	88.1	11.78
209	830	.029	108.7	16.5	25.04	80.2	11.8
209	845	.182	327.8	12.89	26.01	75.6	11.81
209	900	.327	292.2	32.08	26.59	73.9	11.81
209	915	.562	148.2	50.7	27.95	68.24	11.8
209	930	1.147	202.6	32.69	28.12	65.96	11.82
209	945	1.933	227.9	25.07	28.43	62.6	11.81
209	1000	1.537	228.2	21.31	28.63	60.75	11.82
209	1015	1.591	222	21.35	28.89	59.6	11.81
209	1030	1.477	211.5	21.35	29.61	57.85	11.81
209	1045	1.65	201.1	26	29.96	56.22	11.81
209	1100	1.76	213	18.92	30.27	54.61	11.81
209	1115	1.694	205.7	28.62	30.65	53.17	11.81
209	1130	2.013	201.6	14.72	30.94	52.46	11.82
Day 6 209	1145	1.671	195.7	23.84	31.01	51.33	11.81
start 209	1200	1.835	169.6	17.03	31.65	49.76	11.82
209	1215	1.47	254.8	41.95	31.76	48.3	11.82
209	1230	1.119	252.9	50.44	32.15	46.28	11.82
209	1245	1.181	225.8	55.12	32.36	45.9	11.81
209	1300	1.423	248.1	49.86	32.55	44.86	11.83
209	1315	1.622	272.2	36.41	32.9	42.7	11.82
209	1330	1.621	306.5	33.93	32.96	41.26	11.83
209	1345	1.741	262.5	30.98	33.22	37.77	11.83
209	1400	1.575	230.8	49.87	33.21	36.98	11.83
209	1415	1.605	262.4	56.68	33.58	36.92	11.83
209	1430	1.516	239	25.07	33.59	36.91	11.83
209	1445	1.05	244.8	42.85	33.92	36.35	11.83
209	1500	.913	46.03	40.25	33.71	37.79	11.83
209	1515	1.063	62	31.83	33.06	41.34	11.83
209	1530	1.071	116.7	50.75	32.53	46.14	11.83
209	1545	1.02	274.9	45.82	32.97	46.32	11.83
209	1600	1.327	185.6	76.5	33.53	43.78	11.83
209	1615	2.546	110.5	15.73	33.32	43.62	11.82
209	1630	2.351	91.5	18.95	33.15	43.52	11.82
209	1645	1.906	97	16.7	32.32	44.65	11.82
209	1700	1.173	91.1	15.97	31.68	46.65	11.82
209	1715	1.503	110.4	21.1	31.6	48.66	11.81
209	1730	2.573	116.1	12.61	31.45	50.18	11.81
209	1745	2.491	129.1	19.46	31.6	49.68	11.8
209	1800	3.324	135.9	[illegible]	[illegible]	[illegible]	[illegible]

Ref. #23
p. 12 of 26

	209	1815	3.156	124	14.31	31.5	47.24	11.8
	209	1830	2.962	125.1	13.81	31.28	49.23	11.8
	209	1845	3.172	120.3	11.62	31.07	50.9	11.8
	209	1900	3.28	126.8	9.93	30.79	52.84	11.8
	209	1915	2.282	112.5	12.01	30.38	55.3	11.79
	209	1930	1.801	111.4	12.75	29.96	58.12	11.79
	209	1945	1.824	125.6	12.37	29.75	59.36	11.78
	209	2000	1.809	130.2	12.02	29.51	59.7	11.79
	209	2015	.946	130.7	17.38	28.83	62.91	11.78
	209	2030	1.358	155.8	21.41	28.54	64.89	11.78
	209	2045	.469	216.7	25.22	27.2	72.3	11.77
	209	2100	1.433	151.7	5.184	26.89	76.5	11.76
	209	2115	1.728	157.4	4.751	26.9	76.8	11.77
	209	2130	.652	207.9	47.58	25.77	83.6	11.77
	209	2145	.257	274.5	19.61	24.97	89.9	11.75
	209	2200	.37	260	23.62	25.03	89.7	11.76
	209	2215	0	229.1	.5	24.62	92.5	11.75
	209	2230	.192	5.645	42.95	24.38	95.5	11.75
	209	2245	.437	341.8	7.91	24.41	94.6	11.75
	209	2300	.224	285.6	47.08	24.36	93.3	11.76
	209	2315	.66	205.4	19.04	24.3	91.3	11.75
	209	2330	.053	190.1	.547	23.47	95.7	11.75
	209	2345	.031	189.6	.296	23.09	98.6	11.74
stop	210	0	.09	189.5	.37	22.97	100.2	11.74
	210	0	.006	.008	.022	.057	.278	.269
	210	15	.088	189.7	.325	22.91	100.3	11.74
	210	30	.4	255.7	40.47	22.62	100.9	11.74
	210	45	.831	200.6	15.04	22.87	97.5	11.74
	210	100	.424	181.7	37.73	23.32	94.1	11.74
	210	115	.86	255.9	28.32	23.34	90.9	11.75
	210	130	.956	301.9	8.95	22.68	95.1	11.74
	210	145	.78	309.1	11.29	22.92	93	11.74
	210	200	.134	308.2	0	22.48	96.5	11.75
	210	215	.085	274	34.12	22.35	97.7	11.74
	210	230	.176	267.6	32.78	22.16	99.7	11.74
	210	245	.714	309.5	13.19	21.89	99.2	11.74
	210	300	.21	309.6	47.28	21.7	100.5	11.74
	210	315	.942	284.4	14.43	21.71	100.5	11.74
	210	330	.251	147.8	70.6	21.8	99.2	11.74
	210	345	.422	83.4	5.493	21.51	101.4	11.74
	210	400	.334	71.8	.229	21.61	101.5	11.74
	210	415	.142	347.3	32.76	21.63	101.3	11.74
	210	430	.28	304.6	15.84	21.14	102.1	11.74
	210	445	.443	264.8	13.05	20.81	102.8	11.74
	210	500	.732	192.9	10.83	20.97	103.1	11.74
	210	515	.353	179.1	2.222	21.34	102.3	11.74
	210	530	.02	179.8	.084	21.05	101.9	11.74
	210	545	.011	179.9	0	20.58	102.9	11.74
	210	600	0	180.6	.2	20.43	103.5	11.74
	210	615	0	180.3	.056	20.48	103.5	11.74
	210	630	0	180.3	.028	20.67	103.5	11.74
	210	645	.025	198.2	2.779	21.18	103.5	11.73
	210	700	.182	224.1	8.18	21.88	101.7	11.74

Ref. #23 p.

Summary Tables of Windrose Data

Ref. #23 p. 14 of

BOWMAN ENVIRONMENTAL ENGINEERING WROSE COPYRIGHT (C) 198

SUMMARY TABLE OF WINDROSE DATA 7/23/90

Direction	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL
.0	.00000	7.00000	.00000	.00000	.00000	.00000	7.00000
22.5	3.00000	7.00000	.00000	.00000	.00000	.00000	10.00000
45.0	1.00000	2.00000	.00000	.00000	.00000	.00000	3.00000
67.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
90.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
112.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
135.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
157.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
180.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
202.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
225.0	7.00000	.00000	.00000	.00000	.00000	.00000	7.00000
247.5	7.00000	.00000	.00000	.00000	.00000	.00000	7.00000
270.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
292.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
315.0	2.00000	6.00000	.00000	.00000	.00000	.00000	8.00000
337.5	.00000	6.00000	.00000	.00000	.00000	.00000	6.00000
TOTAL	21.00000	28.00000	.00000	.00000	.00000	.00000	49.00000

Press any key.

BOWMAN ENVIRONMENTAL ENGINEERING WROSE

SUMMARY TABLE OF WINDROSE DATA 7/24/90

Direction	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL
.0	4.00000	.00000	.00000	.00000	.00000	.00000	4.00000
22.5	3.00000	.00000	.00000	.00000	.00000	.00000	3.00000
45.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
67.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
90.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
112.5	3.00000	6.00000	.00000	.00000	.00000	.00000	9.00000
135.0	1.00000	2.00000	.00000	.00000	.00000	.00000	3.00000
157.5	5.00000	12.00000	.00000	.00000	.00000	.00000	17.00000
180.0	.00000	5.00000	.00000	.00000	.00000	.00000	5.00000
202.5	.00000	2.00000	.00000	.00000	.00000	.00000	2.00000
225.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
247.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
270.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
292.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
315.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
337.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
TOTAL	22.00000	27.00000	.00000	.00000	.00000	.00000	49.00000

Press any key.

Ref. #23 p. 16of

BOWMAN ENVIRONMENTAL ENGINEERING WROSE COPYRIGHT (C) 198

SUMMARY TABLE OF WINDROSE DATA 7/25/90

Direction	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL
.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
22.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
45.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
67.5	2.00000	.00000	.00000	.00000	.00000	.00000	2.00000
90.0	3.00000	.00000	.00000	.00000	.00000	.00000	3.00000
112.5	2.00000	2.00000	.00000	.00000	.00000	.00000	4.00000
135.0	1.00000	6.00000	6.00000	.00000	.00000	.00000	13.00000
157.5	.00000	9.00000	8.00000	.00000	.00000	.00000	17.00000
180.0	.00000	1.00000	2.00000	.00000	.00000	.00000	3.00000
202.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
225.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
247.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
270.0	5.00000	.00000	.00000	.00000	.00000	.00000	5.00000
292.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
315.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
337.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
TOTAL	15.00000	18.00000	16.00000	.00000	.00000	.00000	49.00000

Press any key.

BOWMAN ENVIRONMENTAL ENGINEERING WROSE

SUMMARY TABLE OF WINDROSE DATA 7/26/90

Direction	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL
.0	4.00000	.00000	.00000	.00000	.00000	.00000	4.00000
22.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
45.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
67.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
90.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
112.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
135.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
157.5	.00000	8.00000	2.00000	.00000	.00000	.00000	10.00000
180.0	1.00000	7.00000	2.00000	.00000	.00000	.00000	10.00000
202.5	10.00000	.00000	.00000	.00000	.00000	.00000	10.00000
225.0	7.00000	.00000	.00000	.00000	.00000	.00000	7.00000
247.5	1.00000	1.00000	.00000	.00000	.00000	.00000	2.00000
270.0	3.00000	.00000	.00000	.00000	.00000	.00000	3.00000
292.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
315.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
337.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
TOTAL	29.00000	16.00000	4.00000	.00000	.00000	.00000	49.00000

Press any key.

Ref. #23 p. 18 of 26

BOWMAN ENVIRONMENTAL ENGINEERING WROSE COPYRIGHT (C) 198?

SUMMARY TABLE OF WINDROSE DATA July 27, 1990

Direction	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL
.0	3.00000	.00000	.00000	.00000	.00000	.00000	3.00000
22.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
45.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
67.5	6.00000	.00000	.00000	.00000	.00000	.00000	6.00000
90.0	3.00000	.00000	.00000	.00000	.00000	.00000	3.00000
112.5	2.00000	.00000	.00000	.00000	.00000	.00000	2.00000
135.0	1.00000	7.00000	1.00000	.00000	.00000	.00000	9.00000
157.5	.00000	.00000	1.00000	.00000	.00000	.00000	1.00000
180.0	1.00000	1.00000	.00000	.00000	.00000	.00000	2.00000
202.5	2.00000	1.00000	.00000	.00000	.00000	.00000	3.00000
225.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
247.5	8.00000	.00000	.00000	.00000	.00000	.00000	8.00000
270.0	5.00000	1.00000	.00000	.00000	.00000	.00000	6.00000
292.5	3.00000	1.00000	.00000	.00000	.00000	.00000	4.00000
315.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
337.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
TOTAL	36.00000	11.00000	2.00000	.00000	.00000	.00000	49.00000

Press any key.

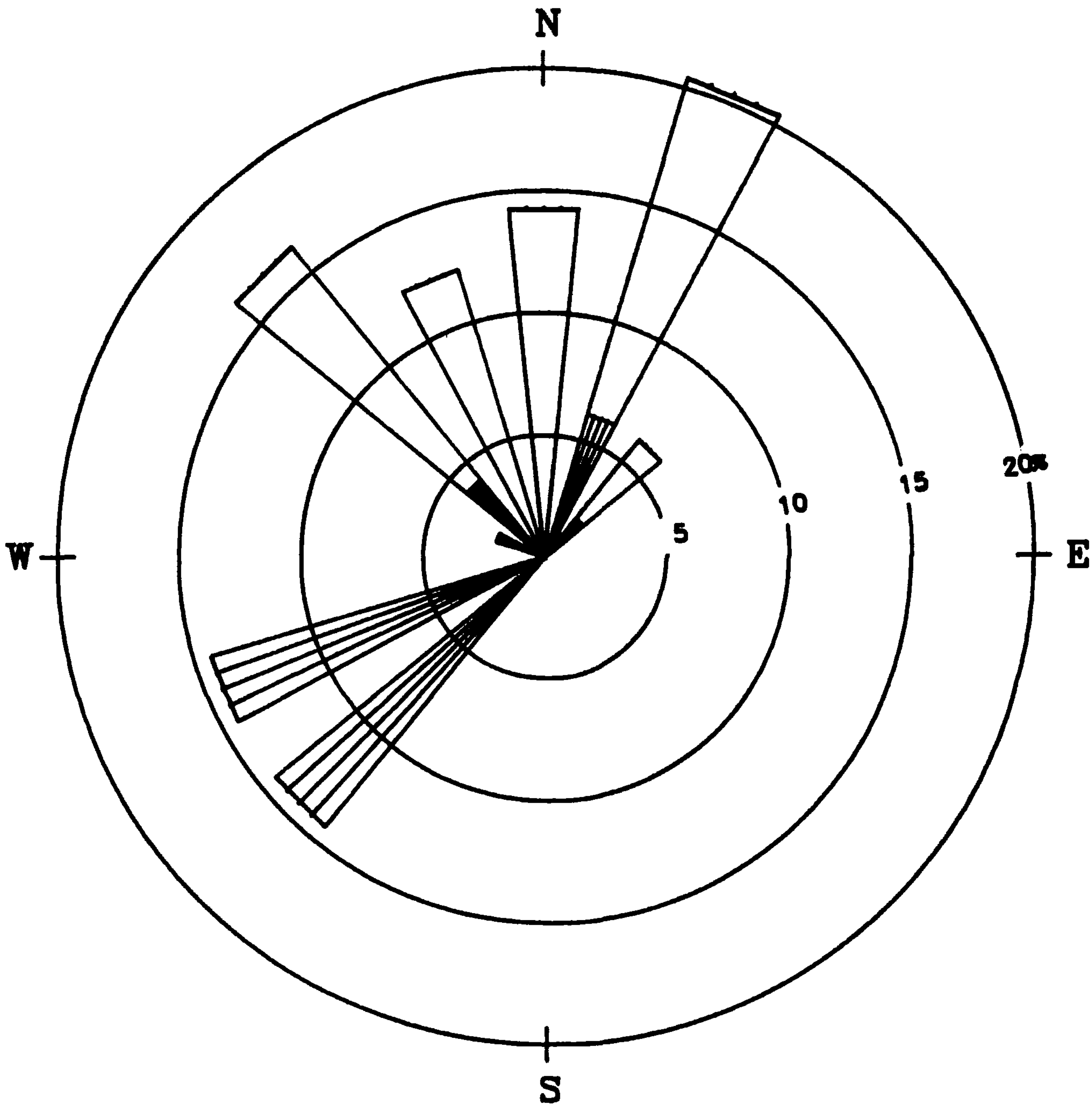
BOWMAN ENVIRONMENTAL ENGINEERING WROSE COPYRIGHT (C) 198[illegible]

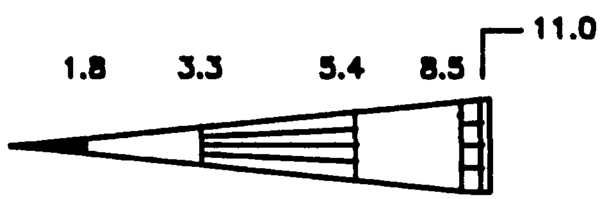
SUMMARY TABLE OF WINDROSE DATA July 28, 1990

Direction	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL
.0	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
22.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
45.0	2.00000	.00000	.00000	.00000	.00000	.00000	2.00000
67.5	.00000	.00000	.00000	.00000	.00000	.00000	.00000
90.0	2.00000	4.00000	.00000	.00000	.00000	.00000	6.00000
112.5	2.00000	9.00000	.00000	.00000	.00000	.00000	11.00000
135.0	3.00000	.00000	1.00000	.00000	.00000	.00000	4.00000
157.5	.00000	1.00000	.00000	.00000	.00000	.00000	1.00000
180.0	4.00000	.00000	.00000	.00000	.00000	.00000	4.00000
202.5	3.00000	.00000	.00000	.00000	.00000	.00000	3.00000
225.0	5.00000	.00000	.00000	.00000	.00000	.00000	5.00000
247.5	6.00000	.00000	.00000	.00000	.00000	.00000	6.00000
270.0	4.00000	.00000	.00000	.00000	.00000	.00000	4.00000
292.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
315.0	.00000	.00000	.00000	.00000	.00000	.00000	.00000
337.5	1.00000	.00000	.00000	.00000	.00000	.00000	1.00000
TOTAL	34.00000	14.00000	1.00000	.00000	.00000	.00000	49.00000

Press any key.

Windrose Graphs





WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

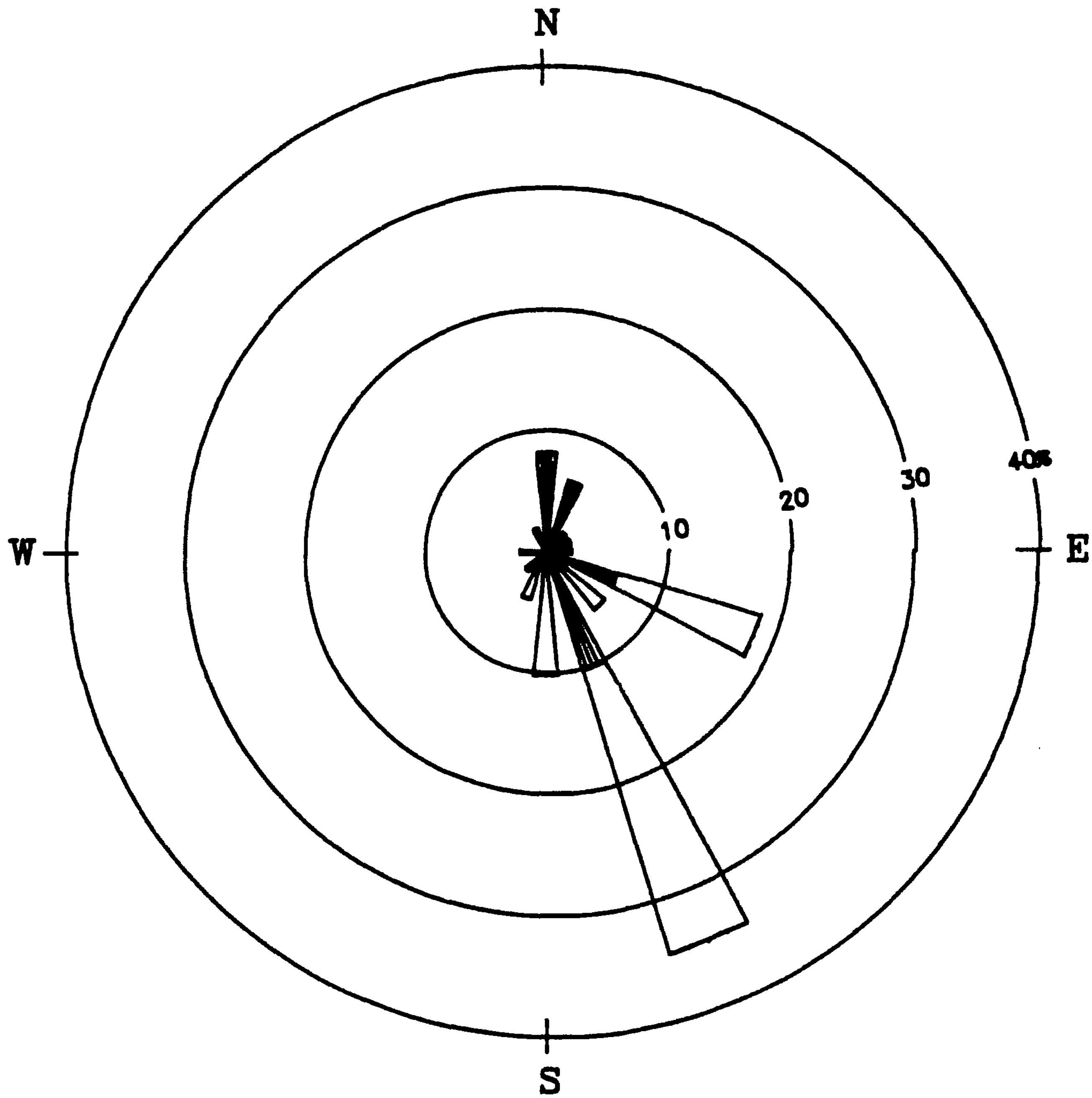
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 14.3 PERCENT OF THE TIME.

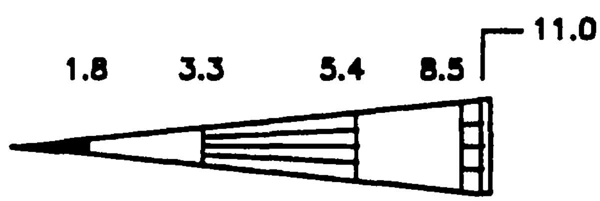
WINDROSE

BIG RIVER
PERIOD: 7/23/90

Bowman Environmental Engineering

Ref. #23 p.22 of [illegible]





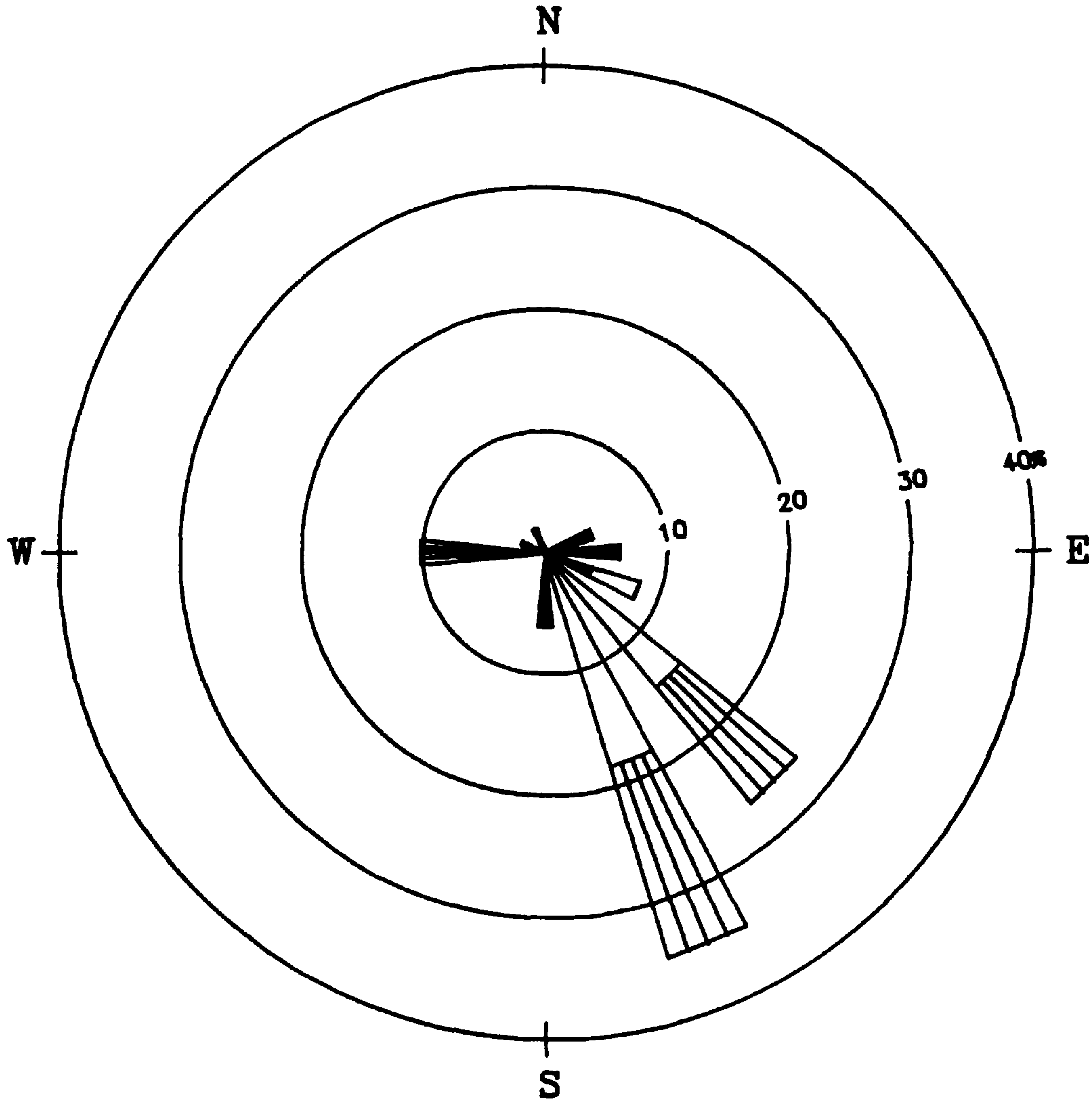
WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

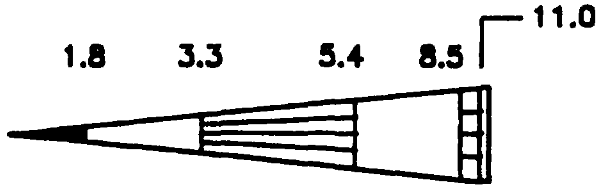
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 8.2 PERCENT OF THE TIME.

WINDROSE

BIG RIVER
PERIOD: 7/24/90

Bowman Environmental Engineering





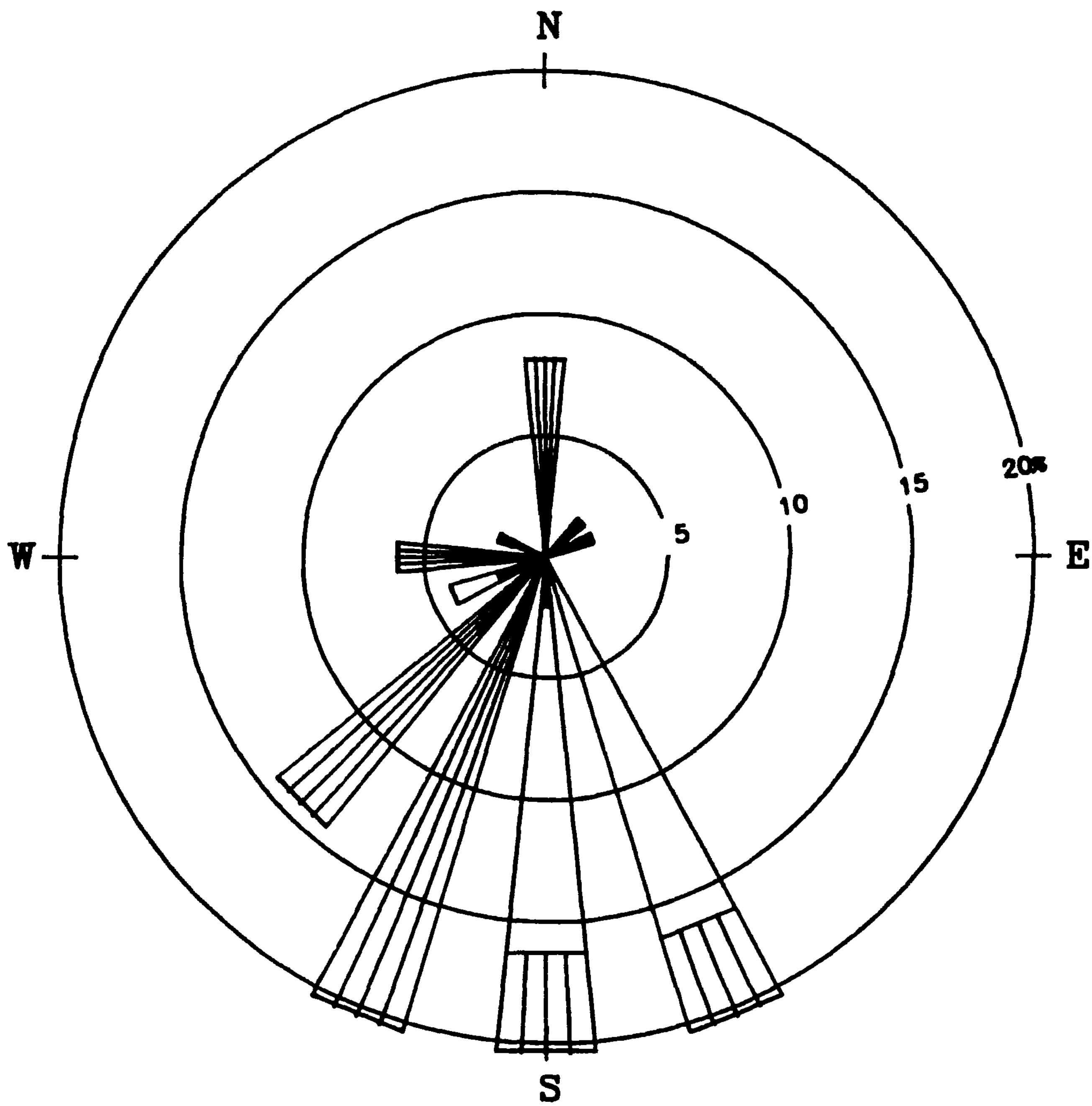
WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

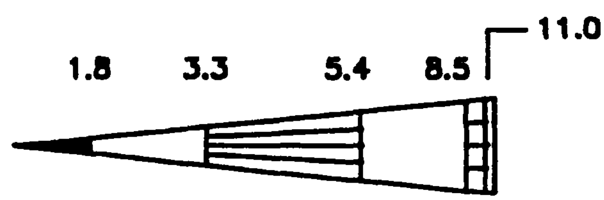
WINDROSE

BIG RIVER
PERIOD: 7/25/90

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION.
WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING.
EXAMPLE – WIND IS BLOWING FROM THE NORTH .0 PERCENT OF THE TIME.

Bowman Environmental Engineering





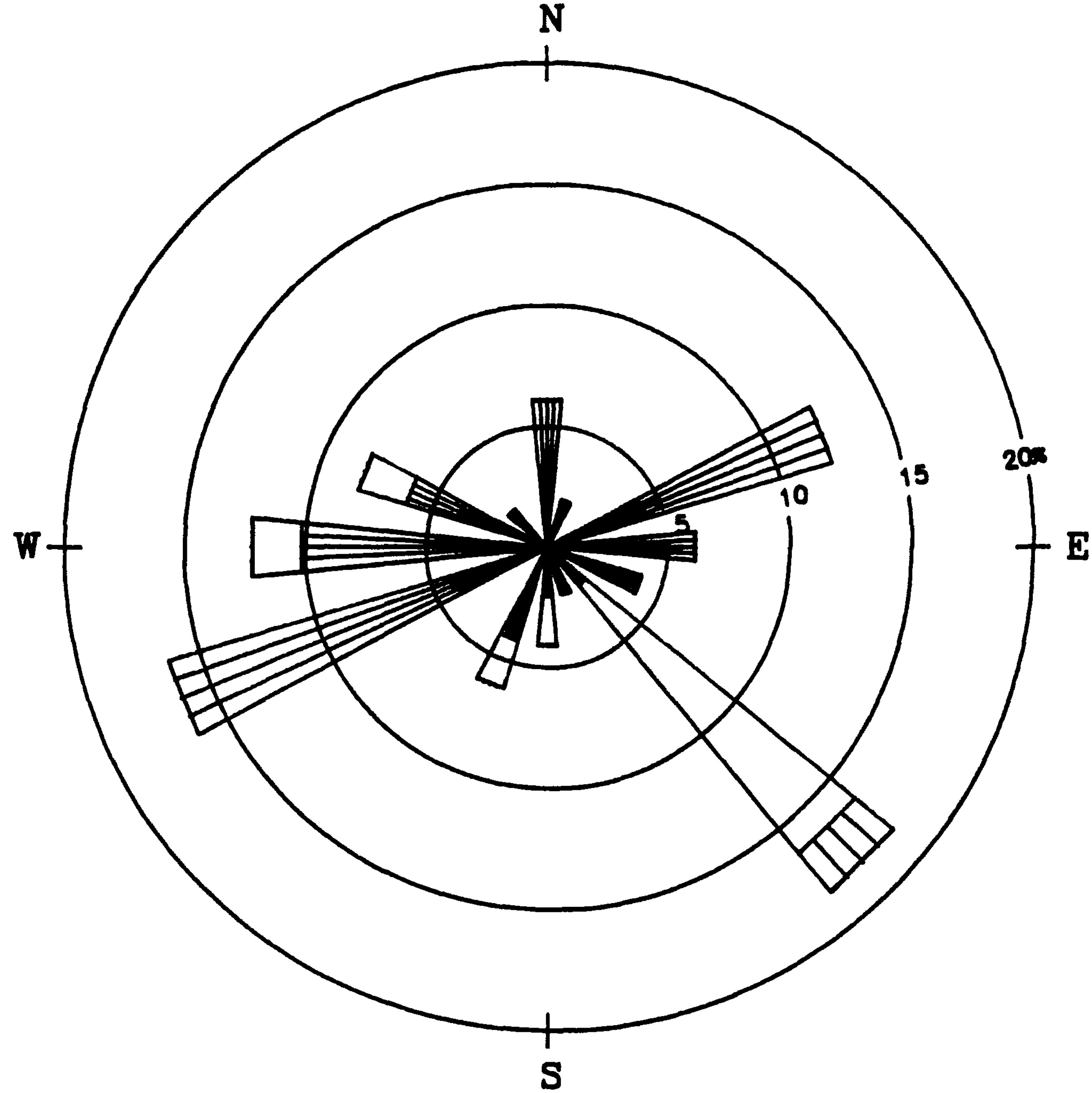
WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

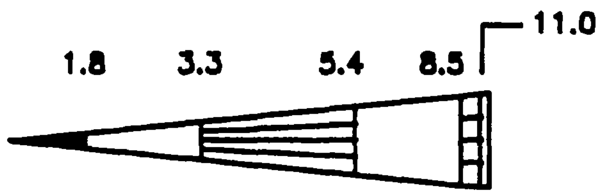
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 8.2 PERCENT OF THE TIME.

WINDROSE

BIG RIVER
PERIOD: 7/26/90

Bowman Environmental Engineering





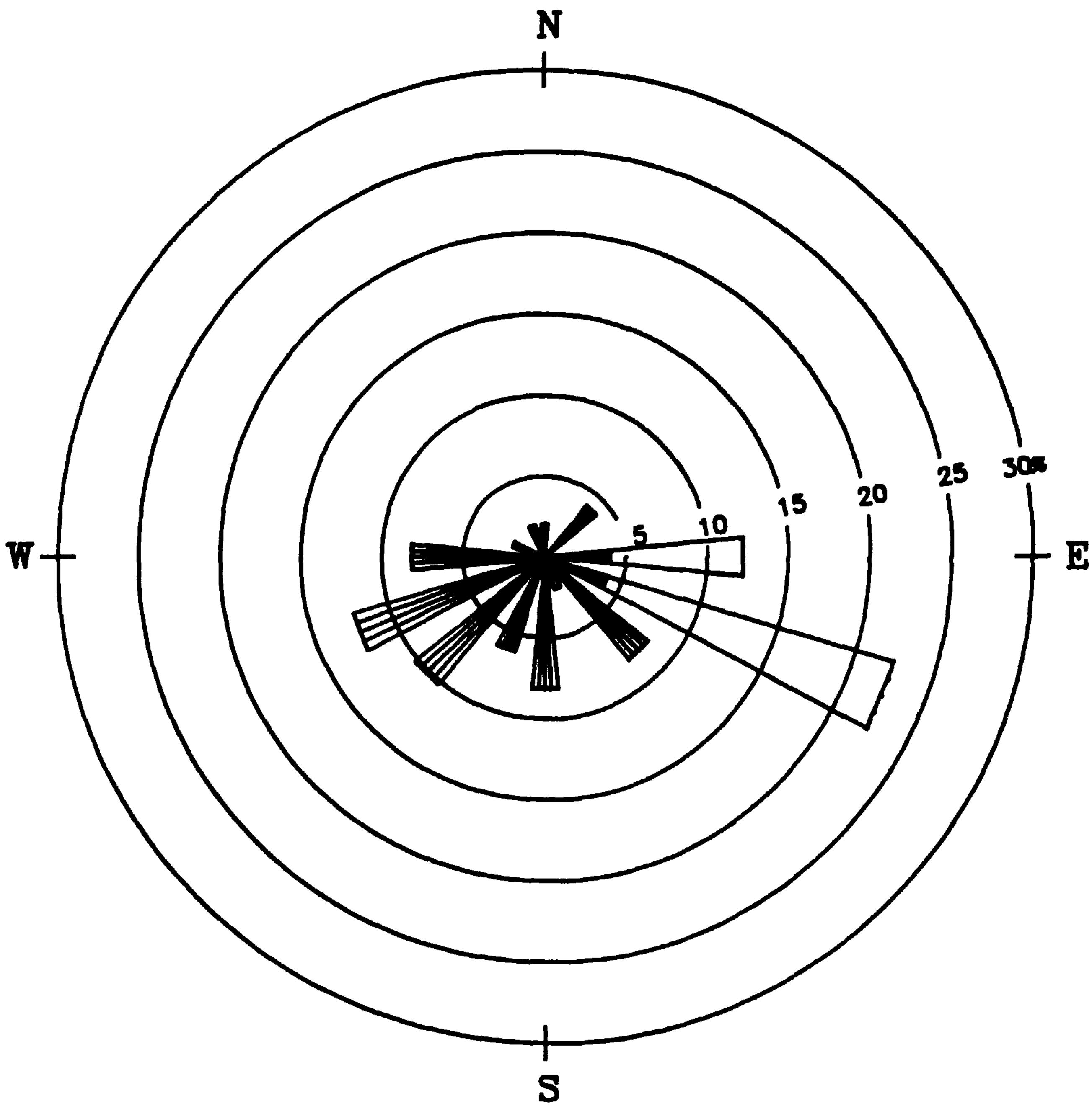
WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

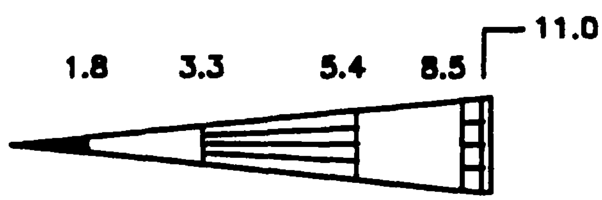
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 6.1 PERCENT OF THE TIME.

WINDROSE

BIG RIVER
PERIOD: 7/27/90

Bowman Environmental Engineering





WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 2.0 PERCENT OF THE TIME.

WINDROSE

BIG RIVER
PERIOD: 7/28/90

Bowman Environmental Engineering

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE July ~~28~~ 29 0.S., 90

PROJECT: Big River Mine Tailings

CALIBRATION ORIFICE UNIT NO. 8061189

CALIBRATED BY: W. McColl/Roberts

SAMPLER NO. BR-AM-~~04~~ 01 0.S.

DATE

$Q_r = a\sqrt{\Delta P} \pm b$ $0.651\sqrt{\Delta P} + 0.0279$

CORRELATION COEFFICIENT (≥0.99) OF r = 0.993689

Q_r = 1.133

$\Delta P = [\frac{QR-b}{a}]^2$ ΔP = 2.881

Run Number	ΔH (negative) Manometer (pressure) in. Water Left / Right	Total	ΔP (x) (positive pressure) Left / Right	Total	$\sqrt{\Delta P}$	Q_r (y) Flow Rate* cmm	cfm
1	0.0 / 1.8	1.8	0.0 / 1.5	1.5	1.22	0.850	30
2	0.0 / 2.65	2.65	0.0 / 2.3	2.3	1.52	0.991	35
3	0.0 / 3.45	3.45	0.0 / 3.0	3.0	1.73	1.133	40 *
4	0.0 / 4.40	4.40	0.0 /	3.70	1.92	1.275	45
5	0.0 / 5.45	5.45	0.0 / 4.40	4.40	2.10	1.420	50
6							
7							
DUP-1							
DUP-2							

* Flow rate from orifice unit calibration chart of equation

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE: July 29, 90

PROJECT: Big River Mine Tailings

CALIBRATION ORIFICE UNIT NO. 8 0G1189

CALIBRATED BY: W. McColl / P. Roberts

SAMPLER NO. BR-AM-Ø2

DATE ______

$Q_r = a\sqrt{\Delta P} \pm b$ $0.577\sqrt{\Delta P} + 0.111$

CORRELATION COEFFICIENT (≥0.99) OF r = 0.994142

$Q_r = 1.133$

$\Delta P = [\frac{QR-b}{a}]^2$ $\Delta P = 3.13$

Run Number	ΔH (negative) Manometer (pressure) in. Water: Left / Right	Total	ΔP (x) (positive pressure): Left / Right	Total	$\sqrt{\Delta P}$	Q_r (y) Flow Rate* cmm	cfm	
1	0.0 / 1.8	1.8	Ø.Ø / 1.60	1.6	1.26	0.850	30	
2	0.0 / 2.65	2.65	Ø.Ø / 2.5	2.5	1.58	0.991	35	
3	0.0 / 3.45	3.45	0.Ø / 3.1	3.1	1.76	1.133	40	*
4	0.0 / 4.40	4.40	Ø.Ø / 3.9	3.9	1.97	1.275	45	
5	0.0 / 5.45	5.1Ø ~~5.45~~	0.Ø / 0.0	4.9	2.21	1.374 ~~1.420~~	50	
6								
7								
DUP-1								
DUP-2								

* Flow rate from orifice unit calibration chart of equation.

Ref. 38a, p. 3 of ÷

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE July 29, 90

PROJECT: Big River Mine Tailings

CALIBRATION ~~ORIFICE~~ UNIT NO. 8061189 CALIBRATED BY: Wes McColl

SAMPLER NO. BR-AM-Ø3 DATE

$Q_r = a\sqrt{\Delta P} \pm b$ $0.659\sqrt{\Delta P} + 0.0104$

CORRELATION COEFFICIENT (≥0.99) OF r = 0.9973973

Q_r = 1.133

$\Delta P = [\frac{QR-b}{a}]^2$ ΔP = 2.9Ø

Run Number	ΔH (negative) Manometer (pressure) in. Water Left / Right	Total	ΔP (x) (positive pressure) Left / Right	Total	$\sqrt{\Delta P}$	Q_r (y) Flow Rate* cmm	cfm
1	0.0 / 1.8	1.8	Ø.Ø / 1.55	1.55	1.24	0.850	30
2	0.0 / 2.65	2.65	Ø.Ø / 2.3	2.3Ø	1.52	0.991	35
3	0.0 / 3.45	3.45	Ø.Ø / 2.95	2.95	1.72	1.133	40 *
4	0.Ø ~~3.45~~ / 4.40	4.40	Ø.Ø / 3.7Ø	3.70	1.92	1.275	45
5	0.0 / 5.45	5.45	Ø.Ø / Ø.Ø	4.5Ø	2.12	1.420	50
6							
7							
DUP-1							
DUP-2							

* Flow rate from orifice unit calibration chart of equation

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE July ~~28~~ 29, 90 O.S.

PROJECT: Big River Mine Tailings

CALIBRATION ORIFICE UNIT NO. 8061189

CALIBRATED BY: W. McCall / P. Roberts

SAMPLER NO. BR-AM-~~0~~4

DATE

$Q_r = a\sqrt{\Delta P} \pm b$ $0.618\sqrt{\Delta P} + 0.120$

CORRELATION COEFFICIENT (≥0.99) OF r = 0.994876

Q_r = 1.133

$\Delta P = [\frac{QR-b}{a}]^2$ ΔP = 2.69

Run Number	ΔH (negative) Manometer (pressure) in. Water Left / Right	Total	ΔP (x) (positive pressure) Left / Right	Total	$\sqrt{\Delta P}$	Q_r (y) Flow Rate* cmm	cfm	
1	0.0 / 1.8	1.8	0.0 / 1.30	1.30	1.14	0.850	30	
2	0.0 / 2.65	2.65	00 / 2.1	2.1	1.45	0.991	35	
3	0.0 / 3.45	3.45	00 / 2.8	2.8	1.67	1.133	40	*
4	0.0 / 4.40	4.40	00 / 3.5	3.5	1.87	1.275	45	
5	0.0 / 5.45	5.45	00 / 4.0	4.3 ~~4.8~~	2.07	1.420	50	
6								
7								
DUP-1								
DUP-2								

* Flow rate from orifice unit calibration chart of equation.

Ref. 38a, p. 5 of

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE July 29, 90

PROJECT: Big River Mine Tailings

CALIBRATION ORIFICE UNIT NO. 8061189 CALIBRATED BY: N. McColl / P. Roberts

SAMPLER NO. BRAM-Ø5 DATE

$Q_r = a\sqrt{\Delta P} \pm b$ 0.597$\sqrt{\Delta P}$+0.0351

CORRELATION COEFFICIENT (≥0.99) OF r = 0.996676

Q_r = 1.133

$\Delta P = [\frac{QR-b}{a}]^2$ ΔP = 3.38

Run Number	ΔH (negative) Manometer (pressure) in. Water Left / Right	Total	ΔP (x) (positive pressure) Left / Right	Total	$\sqrt{\Delta P}$	Q_r (y) Flow Rate* cmm	cfm
1	0.0 / 1.8	1.8	Ø.Ø / 1.80	1.8Ø	1.34	0.850	30
2	0.0 / 2.65	2.65	Ø.Ø / 2.6Ø	~~2.6Ø~~ 2.6Ø	1.61	0.991	35
3	0.0 / 3.45	3.45	Ø.Ø / 3.5	3.5	1.87	1.133	40 *
4	0.0 / 4.40	4.40	Ø.Ø	4.4	2.1Ø	1.275	45
5	0.0 / 5.45	5.45	0.Ø / 5.2Ø	5.2	2.28	1.420	50
6							
7							
DUP-1							
DUP-2							

* Flow rate from orifice unit calibration chart of equation.

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE July 29, 90

PROJECT: Big River Mine Tailings

CALIBRATION ORIFICE UNIT NO. 806 1189

CALIBRATED BY: W. McCall / D. Roberts

SAMPLER NO. BR-AM-06

DATE

$Q_r = a\sqrt{\Delta P} \pm b$ 0.6560 $\sqrt{\Delta P}$ −0.0182

CORRELATION COEFFICIENT (≥0.99) OF r = 0.997427

Q_r = 1.133

$\Delta P = [\frac{QR-b}{a}]^2$ ΔP =

Run Number	ΔH (negative) Manometer (pressure) in. Water Left / Right	Total	ΔP (x) (positive pressure) Left / Right	Total	$\sqrt{\Delta P}$	Q_r (y) Flow Rate* cmm	cfm
1	0 / 1.8	1.8	0 / 1.70	1.70	1.30	0.850	30
2	0 / 2.65	2.65	0 / 2.4	2.4	1.55	0.991	35
3	0 / 3.45	3.45	0 / 3.2	3.2	1.79	1.133	40 *
4	0 / 4.40	4.40	0 / 3.9	3.9	1.97	1.275	45
5	0 / 5.45	5.45	0 /	4.7	2.17	1.420	50
6							
7							
DUP-1							
DUP-2							

* Flow rate from orifice unit calibration chart of equation.

FIGURE 3.1.2

HI VOL SAMPLER CALIBRATION DATA SHEET

DATE July 29, 90

PROJECT: Big River Mine Tailings

CALIBRATION ORIFICE UNIT NO. 806118 9 CALIBRATED BY: McCall / Roberts

SAMPLER NO. BR - AM - Ø7 DATE

$Q_r = a\sqrt{\Delta P} \pm b$ $0.614\sqrt{\Delta P} + 0.000822$

CORRELATION COEFFICIENT (≥0.99) OF r = ~~0.969364~~ O.S. 0.991405 O.S.

$Q_r =$ 1.133

$\Delta P = [\frac{QR-b}{a}]^2$ $\Delta P =$ 3.40

Run Number	ΔH (negative) Manometer (pressure) in. Water Left / Right	Total	ΔP (x) (positive pressure) Left / Right	Total	√ΔP	Q_r (y) Flow Rate* cmm	cfm
1	Ø.Ø / 1.8	1.8	0.Ø / 2.Ø	2.Ø	1.41 ~~1.8~~	0.850	30
2	Ø.Ø / 2.65	2.65	0.Ø / 2.7	2.7Ø	1.64	0.991	35
3	Ø.Ø / 3.45	3.45	Ø.Ø / 3.1Ø	3.1Ø	1.76	1.133	40 *
4	Ø.Ø / 4.40	4.40	Ø.Ø / 4.4	4.4	2.1Ø	1.275	45
5	Ø.Ø / 5.45	5.45	Ø.Ø / 5.4	5.4	2.32	1.420	50
6	~~0.0~~ O.S.						
7							
DUP-1	Ø.Ø / 1.8	1.8	0.0 / 2.Ø	2.Ø	1.41 ~~1.Ø~~	0.850	30
DUP-2	0.0 / 3.45	3.45	0.0 / 3.5	3.5	1.87	1.133	40

* Flow rate from orifice unit calibration chart of equation